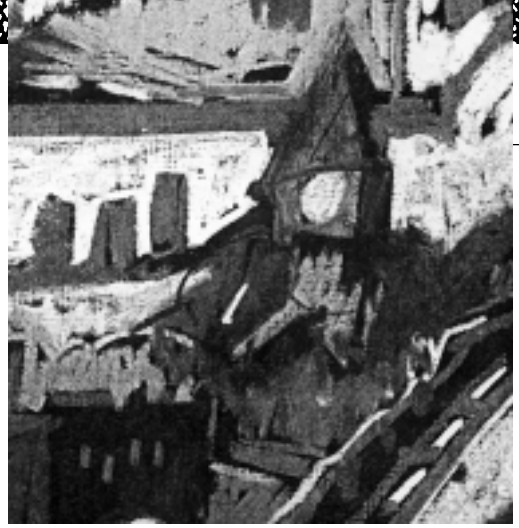

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Appendices

9. APPENDICES

Appendix I – Definitions

General Terms

AASHTO. American Association of State Highway and Transportation Officials.

ADA. Americans with Disabilities Act of 1990. Federal legislation that requires that access to employment, services, and the built environment be provided for people with disabilities.

Building Zone. The portion of a sidewalk adjacent to the property line.

CMAQ. Congestion Mitigation and Air Quality program, a component of ISTEA and TEA 21, federal transportation authorization legislation. CMAQ funds can be used for pedestrian and bicycle facilities.

Cross Slope. The slope of a sidewalk across the travel zone.

Crosswalk. "The portion of a roadway ordinarily included within the extensions of the sidewalk lines, or, if none, then the footpath lines, and, at any place in a highway clearly indicated for pedestrian crossing by lines or markers upon the roadway surface." (Mass. Vehicle Code)

Curb Cut. A break in the curb to provide for a driveway.

Curb Extension. An area where the sidewalk and curb are extended into the street to increase visibility and shorten the crossing distance for pedestrians.

Curb Zone. The portion of the sidewalk immediately adjacent to the curb.

FHWA. Federal Highway Administration.

Grade Separation. The vertical separation of conflicting travel ways with a structure (e.g., a curb).

Highway. See STREET.

ISTEA. Intermodal Surface Transportation Efficiency Act, federal highway funding authorization act created in 1991 which included funds for pedestrian and other non-motor vehicle facilities. Replaced in May 1998 by TEA 21, Transportation Equity Act for the Twenty-first Century.

Multi-use Path. Pathways, usually paved, shared by cyclists, pedestrians, in-line skaters, runners, and other non-motorized travelers, usually excluding horses.

MUTCD. Manual of Uniform Traffic Control Devices, published by the U.S. Department of Transportation and adopted by the Commonwealth of Massachusetts, giving standards for traffic signals, signs, and street markings.

Pedestrian. A person traveling on foot or by wheelchair. Does not include bicyclists (unless walking their bikes) or inline skaters (in Cambridge).

Reveal. The distance between the top of the curb and the top of the roadway pavement.

Right-of-Way. A general term denoting land, property or interest therein, usually in a strip, acquired for or devoted to transportation purposes.

Roadway. The portion of a right-of-way improved, designed, or ordinarily used for vehicle travel.

Sidewalk. Exterior travel facility paralleling a roadway designed for preferential or exclusive use by pedestrians.

Street or Highway. The entire width between the boundary lines of every publicly maintained travel way when any part is open to public motor vehicle traffic.

TEA 21. Transportation Equity Act for the Twenty-first Century, federal highway funding authorization act for 1998-2003. Includes funds for pedestrian and other non-motor vehicle facilities.

TDM. Transportation Demand Management. Various programs and incentives aimed at reducing the number of trips made by single-occupancy vehicles (SOVs) and increasing the number of trips made by high-occupancy vehicles and non-motorized modes, principally public transit, ridesharing, walking, and bicycling.

Travel Zone. The portion of a sidewalk used for pedestrian travel parallel to the street.

VTRO. Vehicle Trip Reduction Ordinance, legislation the Cambridge City Council adopted in 1992 to meet requirements of the 1990 federal Clean Air Act amendments. The ordinance mandates a variety of measures to encourage residents and people commuting to Cambridge to reduce automobile use; these measures include creation of a pedestrian master plan and development of pedestrian amenities.

Walkway. Pedestrian travel facility. Includes sidewalks, paths, plazas, and courts.

Traffic Signal Terms[30]

Actuated. Traffic signals are actuated when the presence of vehicles or a pedestrian pushing a pedestrian button triggers the inclusion of the appropriate phase in the signal sequence. If no vehicle is present or a pedestrian does not push a pedestrian button, that phase in the cycle is skipped.

Clearance Interval. A short time during which all signal indications for conflicting movements are red to allow vehicles to safely clear the intersection.

Concurrent. Any movements are concurrent if allowed at the same time. Normally, such movements do not conflict with each other. However, in the case of a concurrent walk phase, the pedestrian crossing operates simultaneously with the parallel vehicle operation. In this case, a turning vehicle must yield to a pedestrian who has a WALK indication.

Controller. The equipment that controls the timing and sequencing of traffic signals.

Cycle. A complete sequence of signal indications or phases, i.e., the time from the start of a particular phase until that phase starts again.

Exclusive. Any movement is exclusive if it is allocated a phase in which there are no conflicting movements. For example, an exclusive left turn is typically provided with a left turn arrow signal that is green only when signals for opposing traffic are red.
A WALK phase is exclusive when no conflicting vehicle movements are allowed.

Flashing Don't Walk. The period of time during which the DON'T WALK or red hand symbol flashes is the clearance time for pedestrians to cross the roadway. It indicates to pedestrians that if they have already left the sidewalk they will have sufficient time to complete the crossing, but they should not begin to cross.
The amount of time allocated for flashing DON'T WALK is determined by the width of the roadway and the walking speed of pedestrians. It is usually 1 second for each 4 feet from the curb to the center of the far lane.

Interval. A part of the signal cycle during which the signal indications do not change.

Leading Pedestrian Interval. An advance walk signal that gives pedestrians a few seconds' head start on vehicles traveling in the parallel direction, enabling the pedestrians to enter the crosswalk before vehicles begin to turn into their path.

30 Adapted from a glossary compiled by TAMS Consultants, Inc.

Loop or Detector Loop. An electromagnetic cable buried in the roadway that can detect the presence of a vehicle. Detector loops are used to make traffic signals actuated.

Pedestrian Button. A button at a signal-controlled pedestrian crosswalk that, when pushed, triggers the inclusion of the pedestrian phase in the signal cycle. If the button is not pushed, the pedestrian phase is normally skipped.

Phase. The portion of a signal cycle allocated to any single combination of one or more traffic movements simultaneously allowed during one or more intervals.

Phase Sequence. A predetermined order in which the phases of a cycle occur, i.e., the order in which different movements are allowed.

Semi-actuated. Traffic signals are semi-actuated if not all of the intersection approaches have detector loops. The phase for any non-actuated approach will be included during every signal cycle, whether or not a vehicle is present on that approach.

Walk Indication. The period of time when a pedestrian can leave the sidewalk to cross the roadway. The WALK phase must last at least 4 seconds, although generally the City of Cambridge uses a minimum of 7 seconds.

Appendix II-Vehicle Trip Reduction Ordinance

Chapter 10.17
VEHICLE TRIP REDUCTION ORDINANCE

Sections:

10.17.010 Time period of chapter.

Sections 10.17.040 through 10.17.180 of this chapter shall take effect sixty days after final approval by the City Council. The remaining provisions shall not take effect until, and shall at that time supersede and replace Chapter 10.16, sixty days after final approval by the U.S. Environmental Protection Agency (“U.S. EPA”) of a SIP amendment for Massachusetts which (i) contains a program of transportation control measures that are imposed equally on all communities in the Commonwealth such as an employer-based vehicle trip reduction program; and (ii) revokes any provisions of 40 C.F.R. Section 52.1135 that are applicable to Cambridge. (Ord. 1139 (part), 1992)

10.17.020 Findings.

The City of Cambridge finds and determines that:

A. High levels of vehicle traffic and congestion add to air pollution, noise, and inconvenience and erode the quality of the living and working environment.

B. An increasing number of automobile registrations and jobs in the City has resulted in growth of traffic in and around Cambridge.

C. While the City has pursued programs to mitigate these conditions, new measures must be implemented by the City and the Commonwealth involving the participation of all sectors of the community on a local and regional bases to make more efficient use of mass transit, bicycling, walking, and other alternatives to trips by single-occupancy vehicles.

D. The Clean Air Act amendments of 1990 call for the attainment of compliance with the National Ambient Air Quality Standard for Ozone within the Commonwealth by 1999.

E. Attainment of the Ozone Standard will require increased control of vehicle-related air pollution ("transportation control measures") throughout the Commonwealth, as well as the Nation.

F. Throughtrips and other traffic over which Cambridge has no control contribute significantly to the degradation of air quality in the region. The degradation of air quality, particularly ozone, is a regional problem which requires global and regional solutions.

G. A large portion of vehicle traffic on Cambridge streets is attributable to trips that neither originate nor end in Cambridge ("throughtrips"). The City of Cambridge has virtually no control over these throughtrips. Accordingly, it is imperative that DEP amend the SIP to include transportation control measures applicable equally to all communities in the Commonwealth, including an employer-based vehicle trip reduction program, to achieve reductions in the number of vehicle trips and vehicle miles travelled throughout the region.

H. Increasing the use of commuting alternatives and reducing the number of trips by single-occupancy vehicles is beneficial for the City and the Commonwealth in reducing vehicle miles travelled, traffic and associated air pollution, fuel use, noise, and congestion.

I. Programs offered through City Departments, employers, institutions, owners of multiple-tenant buildings and complexes and other organizations to encourage the use of mass transit, bicycling walking, and other alternatives to commuting by single-occupancy vehicles are effective and should be expanded on a citywide and regional basis.

J. The approach which includes, where consistent with employers' needs, adoption and enforcement of driving disincentives, particularly those applicable to the regular work-day commuter, and best suited to accommodate the diverse needs and capabilities of the governmental, business and institutional communities in the City, and recommended for adoption by DEP for state-wide application is a flexible approach which establishes performance coals and permits government and private employers, institutions, and automobile owners to select from among a variety of measures designed to contribute toward reaching the goals.

K. The vehicle trip reduction program recommended for adoption by DEP on a state-wide basis should give credit to those employers which have already made substan-

tial progress in encouraging the use of mass transit, bicycling, walking, and alternative means of commuting and in providing such alternatives.

L. Measures to discourage, and provide alternatives to, vehicle trips and trips by single-occupancy vehicles made by residents of and visitors to Cambridge are also necessary to further the goals of the Clean Air Act.

M. Some of the measures contained in this chapter will achieve immediate reductions in vehicle miles travelled; others are designed to collect information and otherwise lay the foundation for future actions to reduce vehicle miles travelled and improve air quality. To maximize air quality benefits, some types of transportation control measures must be adopted and applied on a regional basis. (Ord. 1139 (part), 1992)

10.17.030 Definitions.

A. "City" means the City of Cambridge, Massachusetts.

B. "Clean fuel" means any fuel or power source used in a vehicle that complies with the applicable standards for clean fuel vehicles contained in Sections 241-245 of the Clean Air Act, 42 U.S.C. §§ 7581—7595.

C. "Clean-fuel vehicle" means a vehicle in a class or category of vehicles which has been certified to meet the applicable clean-fuel vehicle standards as defined by and pursuant to the federal Clean Air Act Amendments of 1990.

D. "Fleet" means ten or more vehicles which are (i) owned, leased, controlled or operated by a single person or entity; or (ii) parked at the same location, excluding vehicles held for lease or rental to the general public, vehicles held for sale by dealers, vehicles used for law enforcement or emergency purposes.

E. "Ozone standard" means the National Ambient Air Quality Standard for Ozone established pursuant to Section 109 of the Clean Air Act, 42 U.S.C. § 7409.

F. "Region" means those communities east of, or through which Route 128 passes.

G. "Selected employers" means those employers in Cambridge who voluntarily agree to participate in the pilot survey of employee commuting characteristics set forth in Section 10.17.130.

H. "Throughtrips" means vehicle traffic on City of Cambridge streets attributable to trips that neither originate nor end in the City of Cambridge.

I. "Transportation control measures" are transportation control strategies aimed at reducing transportation related emissions of pollutants and controlling the growth of future vehicle trips and vehicle miles travelled.

J. "VMT" is an abbreviation for vehicle miles travelled.

K. "AER" is an abbreviation for automobile efficiency rate, a rate determined as set forth in Section 10.17.130(D).

L. "Base AER" is a term for the automobile efficiency rate for the City of Cambridge, more fully described in Section 10.17.130(E). (Ord. 1139 (part), 1992)

10.17.040 Expanded commuter mobility program.

In addition to continuing activities currently in progress, the Commuter Mobility Coordinator shall develop and submit to the Assistant City Manager for Community Development and the City Manager a schedule for implementing additional programs including, but not limited to:

A. A bicycle commuter program, in conjunction with the Traffic and Parking Department and the Bicycle Advisory Committee involving consultation with Cambridge residents and businesses;

B. A program to assist employers in establishing bicycle commuting incentives;

C. A feasibility study of the potential use of an in-City paratransit system of jitney services or shuttles to transit locations, areas of major employment, and major commercial/retail destinations; and

D. A program for publicizing successes achieved by businesses and institutions in decreasing the number of single-occupancy vehicle commuters to their establishments;

E. An education program, including newspaper articles, cable television programs, and public meetings, to inform residents and employees of the need for, and the benefits to be realized from, changes in commuting behavior;

F. The beginning of a commuter ride-share program;

G. A program to encourage businesses to offer discounts on T passes.

The City will provide adequate resources to enhance the ability of the commuter mobility program to work to reduce the vehicle miles travelled in Cambridge.
(Ord. 1139 (part), 1992)

10.17.050 Bicycle and pedestrian mobility program.

The position of Bicycle and Pedestrian Coordinator is created within the Traffic and Parking Department. The City Manager shall, within one month of the effective date of this provision, designate the Bicycle and Pedestrian Coordinator. The Bicycle and Pedestrian Coordinator shall devote at least fifty percent of his/her time to carrying out the tasks required by this provision. The Bicycle and Pedestrian Coordinator shall, in conjunction with the Commuter Mobility Coordinator and the City's existing Bicycle Advisory Committee, (i) design and implement a program to encourage greater use of bicycles as alternatives to single-occupancy vehicles within the city and, (ii) focus the attention of the City on the needs of pedestrians. The program will include, but is not limited to:

A. Development of a Cambridge Bicycle Master Plan;

B. Development of a Cambridge Pedestrian Master Plan;

C. Development and evaluation of recommendations for a regional network of bicycle paths and bicycle priority streets favoring both bicycles and pedestrians;

D. Consultation with Cambridge residents, businesses, institutions and property owners;

E. Funding of bicycle amenities and storage facilities;

F. Funding for pedestrian amenities; and

G. Provision of bicycles for use by City police and Traffic and Parking Department.

The program shall be funded at an initial level of twenty-five thousand dollars annually; these funds shall be in addition to, and not utilized for, the salary of the Bicycle and Pedestrian Coordinator. (Ord. 1139 (part), 1992)

10.17.060 Restrictions on visitor passes.

A. Official City Visitor Passes. The Citywide visitor passes that have been distributed to authorized individuals will be invalid thirty days after the effective date of the ordinance codified in this provision. The Traffic and Parking Department is authorized to issue stickers to individuals or organizations or who would be authorized to receive a Citywide visitor pass. A list of all recipients of Citywide visitor passes shall be main-

tained by the Traffic and Parking Department and shall be made available for public inspection upon request. In order to be effective, a sticker must be affixed to a vehicle and must display the vehicle registration number and an expiration date. These stickers shall be easily distinguishable from the stickers issued to City residents. No Official City Visitor Sticker shall be issued that is valid for a time period longer than one year. The names of individuals and organizations shall be available to the public upon request. The list shall be updated by the Department at least quarterly.

B. Residential Visitor Passes. Beginning on the January first following the effective date of this provision, each residential visitor pass issued by the Traffic and Parking Department shall be designed to display a calendar for the year during which it is valid. To be valid on a given date, the pass must be displayed in the windshield and the date of use must be circled. (Ord. 1146, 1992; Ord. 1139 (part), 1992)

10.17.070 Fees for residential parking stickers.

The fees for residential parking stickers shall be eight dollars per permit per household. (Ord. 1147, 1992)

10.17.080 Study of zoning revisions.

The Cambridge Planning Board (the "Board") shall consider revising the required parking space ratios specified in the City Zoning Ordinance and shall evaluate the effectiveness of such revisions in reducing VMT and traffic congestion and encouraging the increased use of commuting alternatives other than by single-occupant vehicles. The Planning Board shall evaluate the need to reduce the allowed densities to achieve the goal of reduced vehicle miles travelled and shall also consider eliminating the exclusion of parking in the calculation of gross floor area. The Board shall also consider the economic impact of such revisions. Consideration shall be given, without limitation, to such potential revisions as reduction of minimum and maximum parking requirements, special provisions for carpools and vanpools, and encouragement of mixed-use developments.

The Board shall invite testimony from residents, businesses, institutions, and property owners and shall publicly report its recommendations within one year of the effective date of this provision. (Ord. 1139 (part), 1992)

10.17.090 Improved coordination with MBTA.

The City Manager shall initiate meetings with the General Manager of the MBTA to map out a strategy for close cooperation between the City and the MBTA on increasing public transportation services to and within the City. The management of the MBTA will be asked to work to improve existing services and to look into ways in which the MBTA can be of assistance to the City in exploring possible development of a local para-transit system. There shall be a goal of establishing a working joint committee to implement the needed improvements.

The Commuter Mobility Staff shall undertake a survey of residents and commuters to identify barriers to use of the MBTA. The Commuter Mobility Staff shall also conduct widely-advertised public forums in neighborhoods throughout the City. Based on the survey and the results of the public meetings, the Commuter Mobility Staff will make recommendations for improving MBTA service. The recommendations will be available to the public for comment. The Commuter Mobility Staff will request that the MBTA hold one or more public meetings to discuss the recommendations.

The Department of Traffic and Parking and the Commuter Mobility staff shall work with MBTA to (i) improve public transportation schedules and routes; (ii) to improve bus stop signage; and (iii) to review placement of bus stops. The Cambridge Traffic and Parking Department shall also cooperate with the MBTA in an attempt to have the MBTA, at the sites selected by Cambridge, erect bus stop signs that are used in other cities and towns.

Meetings with representatives of the MBTA should also focus on conversion of buses to clean fuels. (Ord. 1139 (part), 1992)

10.17.100 Regulation of idling buses, trucks, and taxis and automobiles.
The Police Department shall promptly review and improve its enforcement of the statutory prohibitions against idling by busses, trucks and taxis and automobiles set forth at G.L., ch. 90, § 16A. Within two months of the effective date of the ordinance codified in this provision, the Commissioner of the Police Department shall report to the City Manager on the Department's implementation of this provision. (Ord. 1139 (part), 1992)

10.17.110 Taxicab improvements.
The License Commission, through the Taxicab Advisory Committee shall consult with the taxicab industry, residents, and commercial establishments in the City and prepare recommendations:

A. To make taxicabs more accessible for use by multiple passengers with different destinations. The object of this recommendation shall be to decrease single-occupant use of taxicabs by providing monetary incentives for the taxicab drivers and reducing the cost for passengers; and
B. About the potential role of taxicabs in a paratransit system for the City; and
C. About conversion of taxi fleets to clean fuels;
D. for new or relocated taxi stands; and
E. For policies or actions that would encourage Cambridge residents to use taxicabs that are licensed in Cambridge instead of taxicabs from other cities. (Ord. 1139 (part), 1992)

10.17.120 Alewife Station and Garage.
The Assistant City Manager for Community Development or his designee shall consult with Alewife neighborhood groups, employers, and other interested persons concerning the demand for (i) a commuter rail station at Alewife, (ii) an expansion of the Alewife garage, and (iii) shuttle bus or van service between Alewife Station and nearby employment sites and stores. The Assistant City Manager shall report his findings to the City Council within one year of the effective date of this provision. (Ord. 1139 (part), 1992)

10.17.130 Pilot survey of commuting characteristics of City employees and employees of selected employers.

A. The City, in consultation with the Selected Employer Steering Committee, shall develop an Employer Survey Kit which may include an Employee Survey Form, administration plan, and Automobile Efficiency Rate ("AER") (defined below) calculation sheet, designed to elicit commuting data from all City employees and employees of Selected Employers which will permit the calculation of an actual AER for each Selected Employer and City Department and will also provide the statistical basis for determining such other characteristics of commuting patterns as may be useful in designing measures to achieve the goals of the Clean Air Act. The Employer Survey Kit shall be prepared and distributed to City Departments and Selected Employers within six months of the effective date of the ordinance codified

in this provision. Each City Department and Selected Employer shall distribute copies of the Employee Survey Form to, and as a goal shall endeavor to collect completed forms from, seventy-five per cent of its employees. Each City Department and Selected Employer shall, no later than three (3) months from the date the Employer Survey Kit is distributed, submit to the Assistant City Manager for Community Development all completed Employee Survey Forms, provided that, any Selected Employer may instead submit a report of the results of the employee survey on a standard AER calculation sheet, signed and certified as to its accuracy by an officer of the Company. A Selected Employer that does not submit the Employee Survey Forms shall retain such forms for a minimum of three years. These forms shall be made available to the Assistant City Manager for Community Development or his designee, upon request.

B. The Selected Employer Steering Committee shall:
    1. Participate with the City in the design of the pilot survey;
    2. Assist in educating and encouraging participation of the selected employer group;
    3. Review with the City the results of the pilot survey; and
    4. Participate in the design of any City-wide employer based vehicle trip reduction program.

C. Each City Department and Selected Employer shall cooperate with the Assistant City Manager for Community Development and the Commuter Mobility Staff in providing information about plans and programs being utilized to encourage commuter travel modes other than by single occupancy vehicles. At such time as the City implements or enforces an employer-based vehicle trip reduction program on a city-wide basis, each City Department and Selected Employer which has cooperated with the Community Development Department and the Commuter Mobility Staff and which has complied with paragraph "A" hereof shall be entitled to use the AER reflected in its initial Employer Survey Response as its baseline AER regardless of the extent of improvements in its AER produced as a result of its cooperation with the Community Development Department or its own commuter mobility initiatives.

D. The Assistant City Manager for Community Development shall make arrangements with the Commuter Mobility Staff to coordinate: (i) participation of the Selected Employers; (ii) preparation and distribution of the Employer Survey Kits; (iii) calculation of the base AER; (iv) review and tabulation of the pilot employer survey responses; (v) recalculation of the base AER based on review and analysis of the pilot employer survey responses. The Assistant City Manager for Community Development shall have the authority to engage the services of technical consultants to assist with these tasks.

E. The phrase Automobile Efficiency Rate ("AER") shall mean the figure calculated by dividing the number of employees who report to a worksite within the City of Cambridge between six a.m. and ten a.m. (inclusive Monday through Friday to achieve a five consecutive weekday average) by the number of vehicles used by those employees to reach the worksite during those hours. Bicycles, public transit vehicles, and approved clean-fuel vehicles shall be excluded from the vehicles counted. Motorcycles and light trucks shall be included in the vehicles counted.

F. The City shall define and make calculations of a base AER for the City of Cambridge as a whole. Such base AER shall initially be derived from the 1990 Census modal share data and travel statistics, the results of the pilot survey of selected employers, and such other data as may be relevant. Subsequently, the City may develop other AERs for categories such as geographical areas of the City, employer types, employer sizes, and the like, as may be determined through the consultative process provided for in Section 10.17.140. The City may also, through the same consultative process, periodically recalculate the base AER or such other AERs to reflect additional data or changes in data as become available.

G. The term "carpool" shall mean a private motor vehicle occupied by two to six employees travelling together for at least seventy-five percent of their commute trip distances.

H. The term "commute alternatives" shall mean carpooling, vanpooling, private bus service, use of public transit, bicycling and/or walking.

I. The term "employee" shall mean any person hired by a public or private employer, including part-time and seasonal employees, who reports to work at least two days a week during five or more months of the year.

J. The term "worksite" shall mean a building or grouping of buildings which are located within the City of Cambridge and are on physically contiguous parcels of land or on parcels separated solely by private or public roadways or rights-of-ways and which are owned, operated, or leased by the same Employer. (Ord. 1139 (part), 1992)

10.17.140 Consultation with employers and residents about employer vehicle trip reduction program.

The Assistant City Manager for Community Development or his designee shall consult with Cambridge businesses, institutions, City departments, the Selected Employer Steering Committee, and residents to evaluate recommendations for a regional employer-based vehicle trip reduction program. During this consultation process, issues to be considered shall include:

A. Whether different areas of the City should be subject to different AER goals, depending on their proximity to public transit;

B. What the annual rate of improvement in the AER goal should be;

C. which, if any of the vehicle trip reduction plan elements identified in Section 10.17.170 should be required to be implemented by all employers in the City;

D. The definition of base AER and the potential appropriateness and definition of AERs for categories such as geographical areas of the city, employer types, employer sizes, and the like;

E. Ways to recognize the uniqueness of employers and their differing needs for employee mobility;

F. Appropriate AER or other references to be used in setting goals for Cambridge employers within a regional vehicle trip reduction program;

G. Whether employers should be required to achieve a base or other AER goal within a specified time period or whether penalties should only be imposed for an employer's failure to implement its plan;

H. Identification and development of mechanisms for transferring and/or sharing use of parking spaces as demand for parking spaces decreases at a given worksite;

I. Evaluation of potential impacts on employment and economic impacts on affected employers and on the City of any proposed measures; and

J. Whether any categories of employers should be exempt. (Ord. 1139 (part), 1992)

10.17.150 Use of fees.

One hundred percent of the funds raised through the sale of residential parking stickers shall be used for implementing the tasks and programs specified in this chapter. (Ord. 1139 (part), 1992)

10.17.160 Recommendations for a SIP amendment applicable to all communities in the Commonwealth.

In order to ensure that the vehicle trip reduction measures in the ordinance codified in this chapter achieve their intended effect of reducing vehicle miles traveled and enhancing air quality in the Commonwealth, the City shall include in its submittal to the Metropolitan Planning Organization ("MPO") and DEP recommendations for an amendment to the State Implementation Plan under the federal Clean Air Act applicable equally to all communities in the Commonwealth. These recommendations shall include, but not be limited to:

A. A proposal for an employer-based vehicle trip reduction program;

B. A proposal for measures applicable to new development projects to mitigate the traffic impacts of such projects and reduce vehicle miles travelled to and from such projects;

C. A proposal for revising state taxing policies concerning employer-paid transportation and parking subsidies;

D. A proposal for evaluating the utility of imposing fees on single-occupant commuter vehicles and/or commuter parking;

E. A proposal for achieving appropriate convenient public transportation from the west and north to Cambridge, including but not limited to support of a circumferential transit system;

F. Preventing the diversion of traffic oriented toward Cambridge to other areas with more limited transit availability;

G. Assuring that Cambridge is not placed at a competitive disadvantage within the region or the Commonwealth;

H. Reducing the growth in volume of throughtrips on Cambridge roadways which is outside the control of the City; and

I. Improved and extended use of water taxis.

Notwithstanding the foregoing, the City in its submittal shall note the absence of consensus about the vehicle trip reduction ordinance as originally proposed. The City shall engage in a further consultation process as outlined in Section 10.17.140. The City shall continue to update the State concerning that process. (Ord. 1139 (part), 1992)

10.17.170 Municipal vehicle trip reduction plans.

Based on its review of the employee survey forms collected pursuant to Section 10.17.130, the Commuter Mobility Staff shall prepare a vehicle trip reduction plan for implementation by City Departments. The plan shall contain a program of measures identical to the program developed after consultation as set forth in Section 10.17.140 which shall be designed to reduce vehicle trips and vehicle miles travelled by municipal employees and thereby improve the City's AER, as computed on the annual AER calculation sheets. The plan may include a variety of measures including,

but not limited to:

A. Dissemination and periodic updating of information on all available transit service to and from the worksite;

B. Advertising, promoting and making available for purchase on the worksite any pass program offered by transit authorities;

C. Recommendations to individual employees of employee-specific travel options to reduce VMT;

D. Incentives and assistance for bicycle commuting including secure parking facilities, shower/changing facilities, and education and training programs;

E. Coordinating, facilitating and providing subsidies for employer-sponsored rideshare programs;

F. Preferential parking for carpools and vanpools;

G. Transportation allowances;

H. Expanding opportunities for alternative work schedules including four-day weeks and flexible schedules to facilitate ridesharing;

I. Elimination or reduction of parking subsidies for single-occupant vehicles;

J. Shuttle service to transit stops; and/or

K. Elimination of employee parking spaces.

After consultation with the Assistant City Manager for Community Development and the City Manager about the plan, the Commuter MobilIty Staff shall promptly distribute it to City Departments for implementation. The Commuter Mobility Staff shall assist City Departments with implementation of the plan. (Ord. 1139 (part), 1992)

10.17.180 Expansion of local employment opportunities.

To demonstrate and further its commitment to increase the number of Cambridge residents employed by Cambridge businesses and reduce vehicle miles associated with work commutes, the annual budget for expansion of local employment opportunities shall be increased to two hundred thirty thousand dollars. That budget shall be applied as follows:

A. To continue and expand the Cambridge Employment Program within the Community Development Department;

B. To sponsor an annual job fair to inform residents of local employment opportunities;

C. To sponsor and coordinate educational partnerships between Cambridge employees and schools in Cambridge; and

D. To develop a Local Employment Opportunity Plan.

These functions shall be coordinated and carried out by the Community Development Department in conjunction with the Department of Human Services and under the supervision of the Assistant City Manager for Community Development. The Local Employment Opportunity Plan shall be developed within one year of the effective date of the ordinance codified in this provision.

[THE FOLLOWING SECTIONS, 10.17.190 THROUGH 10.17.220, ONLY TAKE EFFECT AFTER STATE AND FEDERAL ACTION TO ADOPT A REGIONAL OR STATE-WIDE PROGRAM]

10.17.190 Further expansion of commuter mobility program.

The Assistant City Manager for Community Development, in consultation with the

City Manager, shall have authority to hire additional staff to implement the tasks and programs specified in this Chapter. Within three months of the effective date of this provision, at least one additional Commuter Mobility Staff member shall be hired. The Commuter Mobility Coordinator shall develop and promptly implement additional programs including but not limited to:

A. A program encouraging the use and sharing of computer ride-sharing information between and among businesses and institutions in the City;

B. A program to encourage commercial and retail businesses to offer discounts to patrons with MBTA transit passes; and

C. Implementation of an in-city paratransit system, to the extent funds are available, to supplement MBTA services.

The Commuter Mobility Coordinator shall develop and recommend additional programs, including but not limited to, a residential trip reduction program for apartment and condominium complexes of fifty or more units. (Ord. 1139 (part), 1992)

10.17.200 Restrictions on parking supply.

A. Expansion of Parking Regulation. Within six months of the effective date of the ordinance codified in this provision, the Traffic and Parking Department shall submit to the City Manager an updated written inventory of all on-street parking spaces specifying the restrictions applicable to each such parking space. As to any space which has not been restricted or removed from the supply of on-street spaces pursuant to Section 10.16.071 of this title, the Traffic and Parking Department shall prepare a recommendation for restriction of each such space to discourage its use for long-term commuter parking. These restrictions may include, without limitation an absolute prohibition against parking, installation of parking meters, imposition of time restrictions, and/or restrictions for use by residents with permits. The Director of Traffic and Parking shall make the recommendations available for public review and shall schedule one or more public meetings, as appropriate, for public discussion of the recommendations. Within one month after the public meetings, the Traffic and Parking Department shall submit its revised recommendation to the City Manager. After consultation with the City Manager, the Traffic and Parking Department shall promptly implement the recommendations.

B. Municipal Parking Rates. The rates for daily and monthly parking at all City-owned off-street parking facilities shall be increased by twenty-five percent over current rates, to be effective within sixty days of the effective date of this provision.

C. Exclusive Residential Parking Near MBTA Stations. The Traffic and Parking Department, in consultation with neighborhood groups, residents, commercial establishments, and the City Manager, shall prepare a proposal for establishing exclusive residential parking zones on primarily residential streets located near MBTA stations. The object of the proposal shall be to limit residential parking on targeted streets close to MBTA stations to residents of those neighborhoods by means of appropriate signage and special resident stickers. The Traffic and Parking Department shall convene a public meeting on its proposal within four months of the effective date of this provision. Within one month after such public meeting, and after consultation with the City Manager, the Director of Traffic and Parking shall cause the proposal to be implemented. (Ord. 1139 (part), 1992)

10.17.210 Promotion of clean fuels.

The Department of Public Works shall study, promote, encourage, and identify incentives for the use of clean fuel in fleets of vehicles operating within the City. The study shall include an evaluation of the use of such fuels as methanol, com- pressed natural gas, and reformulated gasoline based on characteristics of fleets in Cambridge and implementation costs. The study shall also identify reasonably available incentives which could be offered by the City, such as tax credits, to encourage use of clean fuel in fleets of vehicles. The sum of fifteen thousand dollars shall be appropriated for this program. (Ord. 1139 (part), 1992)

10.17.220 Development of traffic policy.

The Assistant City Manager for Community Development and the Director of the Traffic and Parking Department, or their designees, shall within one year of the effective date of this provision, conduct a study of major highways, city through streets, streets with schools, different types of residential streets, and streets at the borders of the City. Based on that study, they shall prepare a written recommendation of:

A. Appropriate speeds and volumes for Cambridge streets; and

B. Means of encouraging travel and traffic patterns that reduce VMTs.

This written recommendation shall be submitted to the City Council for review and appropriate action. (Ord. 1139 (part), 1992)

10.17.230 Sunset clause.

The provisions of this chapter shall cease to be effective ninety days after the date the Department of Environmental Protection or the U.S. Environmental Protection Agency adopts a final rule or regulation that imposes transportation control measures including parking supply management measures in Cambridge which do not have an equal impact on the Region. The purpose of this sunset clause is to give the City the opportunity to decide whether to continue to implement the numerous provisions of this chapter in the event that the final rule or regulation puts the City at a competitive disadvantage in the region. (Ord. 1139 (part), 1992)

Appendix III-Transportation Cost Comparison

According to the Sierra Club, major estimates of the total automobile subsidies in the United States range from $378 billion a year to $730 billion a year, or $1,370 to $4,220 per vehicle.[31]

The Conservation Law Foundation has studied the relative costs of travel in the Boston area, including Cambridge.

	Peak Periods	Off-Peak Periods
Bicycling	13¢	13¢
Walking	14¢	14¢
Commuter Rail	29¢	69¢
Car Pooling	41-43¢	33-40¢
Subways or Streetcars*	64¢	95¢
MBTA Buses*	58¢	$1.38
Driving Alone*	81¢ expressway 94¢ streets	79¢ expressway 91¢ streets

*If T ridership increases, cost per mile decreases; if driving increases, cost per mile increases.

Figure 1: Cost Per Mile of Travel in the Boston Area.[32]

Costs included in the chart:

A. User Costs

Private vehicle ownership and operating costs

- Depreciation and financing
- Insurance
- Registration, inspection, title, and licensing fees
- Motor vehicle taxes
- Gasoline and oil
- Repairs, parts, tires
- Tolls
- Parking—residential and paid
- Accidents

B. Government Costs

- State and federal capital investment in transportation infrastructure
- Local government capital, operations, and maintenance

31 Washington State Energy Office, *Municipal Strategies to Increase Pedestrian Travel: Final Report* (1994), p. 5.

32 Conservation Law Foundation, *Road Kill* (May 1994).

- Department of Motor Vehicles operations
- Police, fire, and courts
- Parking (tax breaks)
- Energy supply subsidies
- Accidents (government share of cost)
- Deferred investment
- Air Pollution (government share of cost)

C. Societal Costs

- Air pollution
- Parking (other than that provided by vehicle owners or government)
- Accidents (beyond insurance, traveler, and government shares)
- Economic impact of importing foreign oil
- Noise

D. Costs That Were not Included

- Sprawl
- Expanding and maintaining infrastructure in low-density areas
- Loss of agricultural land
- Loss of open space
- Wetland destruction
- Lower economic productivity due to less intensive development of areas served only by roads rather than by transit and sidewalks
- Water pollution
- Run-off from roads and parking lots
- Oil spills
- Leaking underground storage tanks
- Solid and hazardous wastes
- Auto bodies, tires, and other materials
- Destruction of the ozone layer
- CFAs from car air conditioners
- Toxic air pollution

  Benzene

  Formaldehyde

  1,3-Butadiene

  Acetaldehyde

Also not included are the costs of the Central Artery/Tunnel Project or the possible costs of global climate change.

Appendix IV-Cambridge Households without Cars

Area 4	45%
Riverside	38%
Cambridgeport	33%
Wellington-Harrington	32%
East Cambridge	31%
North Cambridge	29%
Mid-Cambridge	27%
Agassiz	24%
Neighborhood 9	23%
Strawberry Hill	22%
Neighborhood 2/MIT	21%
West Cambridge	16%
Cambridge Highlands	5%

These percentages are based on 1990 US Census percentages for household populations and do not include students in dormitories.

Figure 1: Percentage of Cambridge Households without Motor Vehicles.

Appendix V- Street Classification System

A. Principal Arterial System

The urban principal arterial system serves the major centers of activity, high traffic volumes, the longest trips and carries a high proportion of the total urban area traffic on a minimum of mileage.

Service to abutting land is subordinate to travel service. Any direct access to land should be purely incidental to the primary functional responsibility of this class of roads.

B. Minor Arterial Street System

The minor arterial street system interconnects with and augments the urban principal arterial system. It accommodates trips of moderate length at a somewhat lower level of travel mobility. This system places more emphasis on land access and offers lower traffic mobility for motor vehicles. Such a facility may carry local bus routes and provide intracommunity continuity but ideally does not penetrate identifiable neighborhoods.

C. Collector Street System

The collector street system provides both land access and traffic circulation within residential neighborhoods and commercial and industrial areas. It may penetrate residential neighborhoods, distributing trips from the arterials through the area to their ultimate destination. Collector streets also collect traffic from local streets in residential neighborhoods and channel it into the arterial system. The collector street system may also carry local bus routes.

D. Local Street System

The local street system comprises all facilities not in one of the higher systems. It primarily provides direct access to abutting land and connections to the higher order systems. It covers the lowest level of motor vehicle mobility and usually contains no regular bus routes.

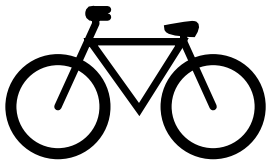
E. Private Way

A private way is a local street that the City Council has not accepted as a public right of way that furnishes the primary means of access to two or more parcels of land.

Appendix VI- Cambridge Traffic Regulations Related to Pedestrians and Bicyclists

ARTICLE I

DEFINITIONS



Sec. 1.4

A. Bicycle
Every device propelled by human power upon which any person may ride, having no more than two tandem wheels either of which is 18" or more in diameter.

B. Bike path
A route for the exclusive use of bicycles separated by grade or other physical barrier from motor vehicles.

C. Bike lane
A lane on a street restricted to bicycles separated by grade or other physical barrier from motor vehicles.

D. Bike route
A roadway shared by both bicycles and other forms of transportation may be designated by means of signs and/or pavement markings.

E. Bicycle parking facility
Any facility for the temporary storage of bicycles which allows the frame and one or both wheels to be locked so as to minimize the risk of theft and vandalism.

Sec. 1.13 Crosswalk
That portion of a roadway ordinarily included within the prolongation or continuation of curb lines and property lines at intersections, or at any portion of the roadway clearly indicated for pedestrian crossing by lines on the road surface or by other markings or signs.

Sec. 1.28 Pedestrians
Any person afoot or riding on a conveyance moved by human power, except bicycles and inline skates.

Sec. 1.50 Vehicle
Every device in, upon or by which any person or property is or may be transported or drawn upon a highway, including bicycles and inline skates when the provisions of these rules are applicable to them, except other devices moved by human power or used exclusively upon stationary rails or tracks.

Sec. 1.52 Inline Skates
Any shoe with an attachment of 4 or more wheels aligned in a linear fashion.

Sec. 1.8 CENTRAL SQUARE BUSINESS DISTRICT
The Central Square Business District for the purposes of these regulations shall be defined as that part of the City of Cambridge included by the following streets or parts thereof:

Bishop Allen Drive.- Main St. to Inman St.

Bigelow St. - Mass. Ave. to the North Curb line of City Hall drive

Brookline St. - Green St. to Mass. Ave.

Central Square

Columbia St. - Bishop Allen Drive to Mass. Ave.

Douglas St. - Bishop Allen Drive to Mass. Ave.

Essex St. - Bishop Allen Drive to Mass. Ave.

Franklin St. - Pearl St. to Pleasant St.

Green St. - Sidney St. to Sellers St.

Inman St. - north curb line of Bishop Allen Drive to Mass. Ave.

Magazine St. - Franklin St. to Green St.

Main St. - Mass. Ave. to east curb line of Cherry St.

Mass. Ave. - west curb line of Sellers St. to the east curb line of Sidney St.

Norfolk St. - Bishop Allen Drive to Mass. Ave.

Pearl St. - Franklin St. to Mass. Ave.

Pleasant St. - Franklin St. to Mass. Ave.

Prospect St. - Bishop Allen Drive to Mass. Ave.

River St. - Franklin St. to Mass. Ave.

Sellers St. - Green St. to Mass. Ave.

Sidney St. - Green St. to Mass. Ave.

Temple St. - Mass. Ave. to Bishop Allen Drive

Western Ave. - Franklin St. to Mass. Ave.

Sec. 1.20 HARVARD SQUARE BUSINESS DISTRICT

The Harvard Square Business District for the purposes of these regulations shall be defined as that part of the City of Cambridge included by the following streets or parts thereof:

Appian Way - Brattle St. to Garden St.

Bow St. - Mass. Ave. to Mt. Auburn St.

Brattle Square

Brattle St. - Appian Way to Mass. Ave.

Cambridge St. - Broadway to Mass. Ave.

Church St. - Brattle St. to Mass. Ave.

DeWolfe St. - Bow St. to Memorial Drive

Dunster St. - Mass. Ave. to South St.

Farwell Place - Brattle St. to end of street

Garden St. - west curb line of Appian Way to Mass. Ave.

Harvard St. - Quincy St. to Mass. Ave.

Holyoke St. - Mass. Ave. to Memorial Drive

John F. Kennedy St. - Mass. Ave. to Memorial Drive

Linden St. - Mass. Ave. to Bow St.

Mass. Ave. - north curb line of Cambridge St. to east curb line of Quincy St.

Mt. Auburn St. - west curb line of Story St. to DeWolfe St.

Palmer St. - Church St. to Brattle St.

Peabody St. - Mass. Ave. to Cambridge St.

Plympton St. - Mass. Ave. to Memorial Drive

Quincy St. - Broadway to Harvard St.

South St. - John F. Kennedy St. to Dunster St.

Story St. - Mt. Auburn St. to Brattle St.

ARTICLE IX

RULES OF THE ROAD

Sec. 9.18 VEHICLE OPERATION AT CROSSWALKS

A. When traffic-control signals are not in place or not in operation the driver of a vehicle, which for the purposes of this regulation shall include bicycles, shall yield the right of way, slowing down or stopping if need be so to yield, to a pedestrian crossing the roadway within a marked crosswalk when the pedestrian is upon the half of the roadway upon which the vehicle is traveling or when the pedestrian approaches from the opposite half of the roadway to within 5 feet of that half of the roadway upon which the vehicle is traveling. No operator of a vehicle shall pass any other vehicle which has been stopped at a marked crosswalk to permit a pedestrian to cross a way, nor shall any operator enter a marked crosswalk until there is sufficient space on the other side of the crosswalk to accommodate the vehicle he is operating notwithstanding any traffic-control signal indication to proceed.

B. The provisions of these regulations and those drafted under the provisions of General Laws, Chapter 90, Section 18A, shall in no way abrogate the provisions of Chapter 90, sections 14 and 14A of the General Laws (Ter. Ed.) which provides: "Precautions for Safety of Other Travelers" and for the "Protection of Blind Persons Crossing Ways." Furthermore, notwithstanding the provisions of these regulations every driver of a vehicle shall exercise due care to avoid colliding with any pedestrian upon the roadway and shall give warning by sounding the horn when necessary and shall exercise proper precautions which may become necessary for safe operation.

ARTICLE XI

PEDESTRIANS' RIGHTS AND DUTIES

Sec. 11.1 PEDESTRIANS CROSSING WAYS OR ROADWAYS

Pedestrians shall obey the directions of police officers directing traffic; and whenever there is an officer directing traffic, a traffic control signal or a marked crosswalk within 300 feet of a pedestrian, no such pedestrian shall cross a way or roadway except within the limits of a marked crosswalk and as hereinafter provided in these regulations. For the purpose of these regulations, a marked crosswalk shall only be construed to be that area of the roadway reserved for pedestrian crossing located between two solid white reflectorized six inch pavement markings, and markings or lines being no less than six feet apart.

Sec. 11.2 PEDESTRIAN ACTUATION

A. At a traffic-control signal location where pedestrian indications are provided but which are shown only upon actuation by means of a pedestrian push button, no pedestrian shall cross a roadway unless or until the pedestrian control signal push button has been actuated and then cross only on the proper pedestrian signal indication. At traffic-control signal locations where no pedestrian indication is provided, pedestrians shall cross only on the green indication. If necessary, the green indication shall be actuated by the pedestrian by means of a push button.

B. At a traffic-control signal location, pedestrians shall yield the right of way to vehicles of a funeral or other procession or authorized emergency vehicle while in performance of emergency duties regardless of the signal indication given, and they shall not attempt to cross the roadway until such vehicles or procession has passed at which time pedestrians shall then cross the roadway only as provided in these regulations.

Sec. 11.3 PEDESTRIANS SUBJECT TO TRAFFIC-CONTROL SIGNALS
Pedestrians shall be subject to traffic-control signals as heretofore declared in sections 4.5, 4.6 and 4.7 of these regulations, but at all other places pedestrians shall be granted those rights and be subject to the restrictions stated in this article.

Sec. 11.4 PEDESTRIAN CROSSINGS AND USE OF ROADWAY

A. No pedestrian shall suddenly leave a sidewalk or safety island and walk or run into the path of a vehicle which is so close that it is impossible for the driver to yield the right of way.
B. Pedestrians shall at all times attempt to cross a roadway using the right half of crosswalks.
C. Where sidewalks are provided, it shall be unlawful for any pedestrian to walk along and upon an adjacent roadway whenever the sidewalk is open to pedestrian use.
D. Where sidewalks are not provided, any pedestrian walking along and upon a highway shall, when practicable, walk only on the left side of the roadway on its unfinished shoulder facing traffic which may approach from the opposite direction.
E. Persons alighting from the roadway side of any vehicle parked at the curb or edge of roadway shall proceed immediately to the sidewalk or edge of roadway adjacent to vehicle, and shall cross the roadway only as authorized by these regulations.
F. It shall be unlawful for any person to actuate a pedestrian control signal or to enter a marked crosswalk unless a crossing of the roadway is intended.

Sec. 11.5 CROSSING AT NON-SIGNALIZED LOCATIONS

A. Every pedestrian crossing a roadway at any point other than within a marked crosswalk, as referred to in section 1, shall yield the right of way to all vehicles upon the roadway. At a point where a pedestrian tunnel or overpass has been provided, pedestrians shall cross the roadway only by the use of the tunnel or overpass.
B. No pedestrian shall cross a roadway at any place other than by a route at right angles to the curb or by the shortest route to the opposite curb except in a marked crosswalk.

Sec. 11.6 OBEDIENCE OF PEDESTRIANS TO RAILROAD SIGNALS
No pedestrian shall pass through, around, over, or under any crossing gate or barrier at a railroad grade crossing while such gate or barrier is closed or is being opened or closed.

Sec. 11.7 PEDESTRIANS SOLICITING RIDES OR BUSINESS
No person shall stand in a roadway for the purpose of soliciting a ride, employment, or business from the occupant of any vehicle.

Sec. 11.8 PENALTIES
Any person who violates the provisions of this regulation which deal with the proper use of ways by pedestrians shall be punished as provided in chapter 90, sec. 18A of the General Laws (Ter. Ed.)

ARTICLE XII

REGULATIONS FOR BICYCLES

Sec. 12.1 TRAFFIC LAWS APPLY TO PERSONS RIDING BICYCLES
Every person riding a bicycle upon a roadway shall be granted all of the rights and shall be subject to all of the duties applicable to the driver of a vehicle by the laws of this state declaring rules of the road applicable to vehicles or by the traffic regulations of this city applicable to the driver of a vehicle, except as to special regulations

in this article and except as to those provisions of laws and regulations which by their nature can have no application.

Sec. 12.2 OBEDIENCE TO TRAFFFIC CONTROL DEVICES

A. Any person operating a bicycle shall obey the instructions of official traffic control signals, signs and other control devices applicable to vehicles, unless otherwise directed by a police officer.

B. Whenever authorized signs are erected indicating that no right or left or U turn is permitted, no person operating a bicycle shall disobey the direction of any such sign, except where such person dismounts from the bicycle to make any such turn, in which event such person shall then obey the regulations applicable to pedestrians.

Sec. 12.3 REQUIRED EQUIPMENT

A. Every bicycle operated upon a way shall be equipped with a braking system to enable the operator to bring the bicycle traveling at a speed of fifteen miles per hour to a smooth safe stop within thirty feet on a dry, clean, hard, level surface.

B. Every bicycle when in use during the period from one-half hour after sunset to one-half hour before sunrise, shall be equipped with a lamp on the front which shall emit a white light visible from a distance of at least 500' to the front. To the rear, either a red lamp or a red reflector visible for not less than 600' when directly in front of lawful lower beams of head lamps on a motor vehicle.

C. The operator shall not carry any package, bundle or article except in a basket, rack, trailer or other device designated for such purpose. The operator shall keep at least one hand upon the handlebars at all times.

Sec. 12.4 RIDING ON BICYCLES

A. A bicycle operator shall give an audible warning whenever necessary to insure the safe operation of the bicycle; however, the use of a siren or whistle is prohibited.

B. The operator shall ride only upon or astride a permanent and regular seat attached to the bicycle.

A passenger shall ride only upon or astride a permanent and regular seat attached to the bicycle or to a trailer towed by the bicycle.

C. Any person twelve years of age or younger operating a bicycle or being carried as a passenger on a bicycle shall wear a helmet which meets the latest standards established by the American National Standards Institute or the Snell Memorial Foundation.

D. During the period from one-half hour after sunset to one-half hour before sunrise, the operator shall display either on each pedal of their bicycle a reflector or on each ankle reflective material which is visible from all angles for a distance of 600' when directly in front of lawful low beams of headlamps of a motor vehicle.

E. In the event of a collision between the operator of a bicycle and a pedestrian both parties shall stop and exchange the following information: name, address and location.

Sec. 12.5 RIDING ON ROADWAYS

A. The bicycle operator shall ride single file on any way except when passing. The bicycle operator may keep to the right when passing a motor vehicle which is moving in the travel lane or the way. The bicycle operator shall not pass to

the right of a bus or minibus stopped at a designated bus stop.

B. Bicycle operators shall signal by either hand their intention to stop or turn.

C. Bicycle operators shall not permit their bicycle to be drawn by any other moving vehicle.

Sec. 12.6 EMERGING FROM ALLEY OR DRIVEWAY

The driver of a bicycle emerging from an alley, driveway or building shall upon approaching a sidewalk or the sidewalk area extending across any alleyway, yield the right of way to all pedestrians approaching on said sidewalk or sidewalk area, and upon entering the roadway shall yield the right of way to all vehicles approaching on said roadway.

Sec. 12.7 RIDING ON SIDEWALKS

A. Pedestrians have the right of way on all sidewalks. The operator of a bicycle shall yield to pedestrians in all traffic situations.

B. The operator of a bicycle shall ride at a speed no greater than an ordinary walk when on a sidewalk or when entering or leaving a sidewalk.

C. The operator of a bicycle shall give an audible warming before passing a pedestrian far enough in advance to allow the pedestrian time to react.

D. No one shall operate a bicycle on a sidewalk in a manner that endangers or would be likely to endanger any person or property.

E. The operator of a bicycle shall comply with all Federal, State and local regulations concerning lighting and helmet use as they apply to roadways when riding on a sidewalk.

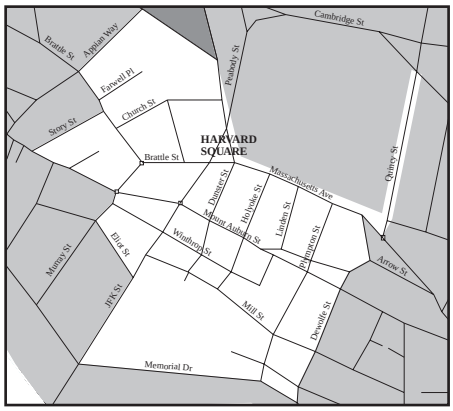
Sec. 12.8 SIDEWALK CYCLING BANNED ON CERTAIN STREETS AND DISTRICTS

A. No person shall ride a bicycle on any sidewalk within a business district as defined in Article I.

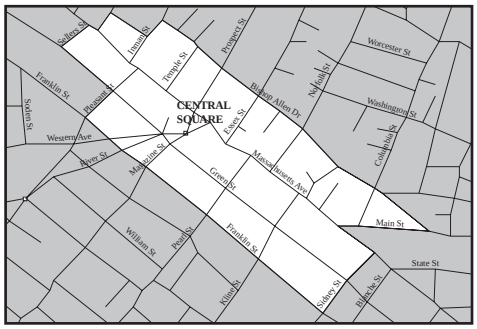
B. No person shall ride a bicycle on any sidewalk described in schedule 4B attached to and made part of these regulations and which has been posted with appropriate signs.

C. No person thirteen years of age or older shall ride a bicycle on any sidewalk described in schedule 4C attached to and made part of these regulations and which has been posted with appropriate signs.

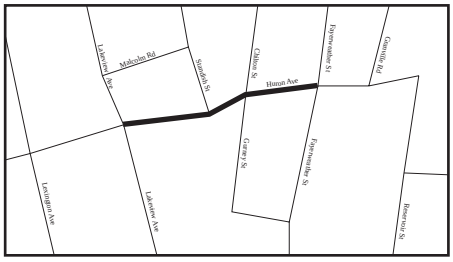
Sidewalk Bicycling Banned Areas



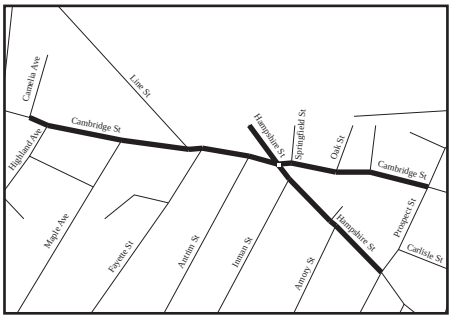
Harvard Square Business District



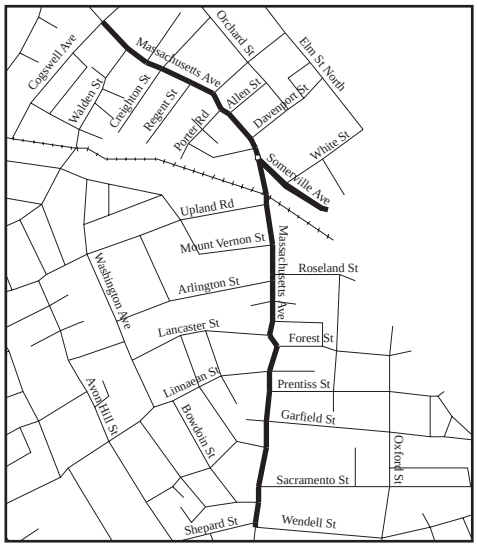
Central Square Business District



Huron Village



Inman Square



Massachusetts Avenue
Russell Street to Wendell Street
(both sides)

Appendix VII-LOS Definitions for Pedestrians and for Motor Vehicles

Levels of Service for pedestrians have traditionally been measured in terms of sidewalk crowding. A more significant measure is probably the amount of delay pedestrians experience at intersections. Both measures are described below.

Pedestrian Levels of Service Based on Intersections

— From Joseph S. Milazzo II, et al., *Quality of Service for Interupted Pedestrian Facilities in the 2000 Highway Capacity Manual*

Recommended HCM 2000 pedestrian Level of Service (LOS) criteria for **signalized** crossing delay

LOS	Average Delay Per Pedestrian (seconds)	Likelihood of Pedestrian Noncompliance
A	< 10	Low
B	10-20	
C	20-30	Moderate
D	30-40	
E	40-60	High
F	≥ 60	Very High

Recommended HCM 2000 pedestrian Level of Service (LOS) criteria for **unsignalized** crossing delay

LOS	Average Delay Per Pedestrian* (seconds)	Likelihood of Risk-Taking Behavior by Pedestrians**
A	< 5	Low
B	5-10	
C	10-20	Moderate
D	20-30	
E	30-45	High
F	≥ 45	Very High

* Delay includes waiting on one side to begin crossing and/or waiting in the median to complete the crossing
** Likelihood of acceptance of short gaps

Pedestrian Levels of Service Based on Sidewalk Crowding

— From U.S. Department of Transportation, *Planning and Maintenance of Pedestrian Facilities*, FHWA-1P-88-019

Walkway Level of Service A
Average Flow Volume: 4 PFM[33] or less

Average Speed: 260 ft./min.

Average Pedestrian Area Occupancy: > 65 sq.ft./person or greater

Description: Virtually unrestricted choice of speed; minimum maneuvering to pass; crossing and reverse movements are unrestricted; flow is approximately 25 percent of maximum capacity.

Walkway Level of Service B
Average Flow Volume: <7 PFM

Average Speed: 25-260 ft./min.

Average Pedestrian Area Occupancy: > 40 sq. ft./person

Description: Normal walking speeds only occasionally restricted; some occasional interference in passing; crossing and reverse movements are possible with occasional conflict; flow is approximately 35 percent of maximum capacity.

Walkway Level of Service C
Average Flow Volume: <10 PFM

Average Speed: 230-250 ft./min.

Average Pedestrian Area Occupancy: > 24 ft./person

Description: Walking speeds are partially restricted; passing is restricted but possible with maneuvering; crossing and reverse movements are restricted and require significant maneuvering to avoid conflict; flow is reasonably fluid and is about 40-65 percent of maximum capacity.

Walkway Level of Service D
Average Flow Volume: <10 PFM

Average Speed: 200-230 ft./min.

Average Pedestrian Area Occupancy: > 15 ft./person

Description: Walking speeds are restricted and reduced, passing is rarely possible without conflict; crossing and reverse movements are severely restricted with multiple conflicts; some probability of momentary flow stoppages when critical densities might be intermittently reached; flow is approximately 65-80 percent of maximum capacity.

Walkway Level of Service E
Average Flow Volume: <25 PFM

Average Speed: 110-200 ft./min.

Average Pedestrian Area Occupancy: > 6 ft./person

Description: Walking speeds are restricted and frequently reduced to shuffling; frequent adjustment of gait is required and passing is impossible without conflict; crossing and reverse movements are severely restricted and conflict

33 Pedestrians per foot width of walkway per minute.

is unavoidable; flow attains maximum capacity under pressure, but with frequent stoppages and interruptions of flow.

Walkway Level of Service F
Average Flow Volume: 25 PFM or more

Average Speed: 0-110 ft./min.

Average Pedestrian Area Occupancy: < 6 ft./person

Description: Walking speed is reduced to shuffling; passing is impossible; crossing and reverse movements are impossible; physical contact is frequent and unavoidable; flow is sporadic and on the verge of complete breakdown and stoppage.

Intersection Levels of Service for Vehicles

— From Milazzo et al.

Levels of Service Definitions for Motor Vehicles

Level of Service (LOS) is used to denote intersection operating conditions for motor vehicles and is represented on a scale ranging from "A" at the highest level to "F" at the lowest level. Levels of service "A" through "D" are generally considered acceptable, while levels "E" and "F" are to be avoided if possible. At level of service "A," drivers experience little delay and intersections operate under free-flow conditions. Levels of service "B" through "D" represent increasing amounts of delay and increasing numbers of vehicles that are stopped and may have to wait through more than one red signal. At level of service "E" the intersection is approaching capacity and is processing the maximum possible number of vehicles. Long backups and queues of vehicles occur, and many vehicles wait through more than one light cycle. Level of service "F' results from volumes in excess of capacity and is characterized by jammed conditions.

1994 HCM **signalized** intersection Level of Service criteria

LOS	Stopped Delay Per Vehicle (seconds)
A	< 5
B	5-15
C	15-25
D	25-40
E	40-60
F	≥ 60

SOURCE: *TRB, 1994*

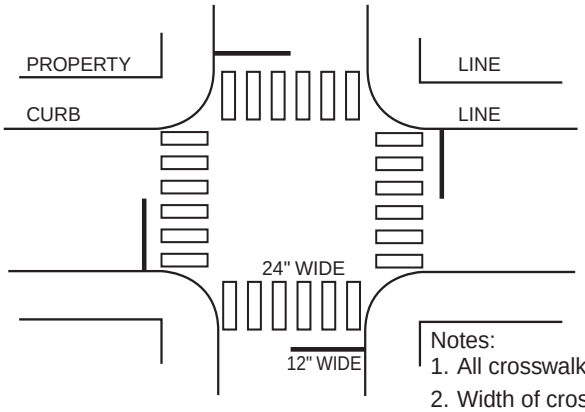
1994 HCM **unsignalized** intersection Level of Service criteria for vehicles

LOS	Average Total Delay (seconds/vehicle)
A	< 5
B	5-10
C	10-20
D	20-30
E	30-45
F	≥ 45

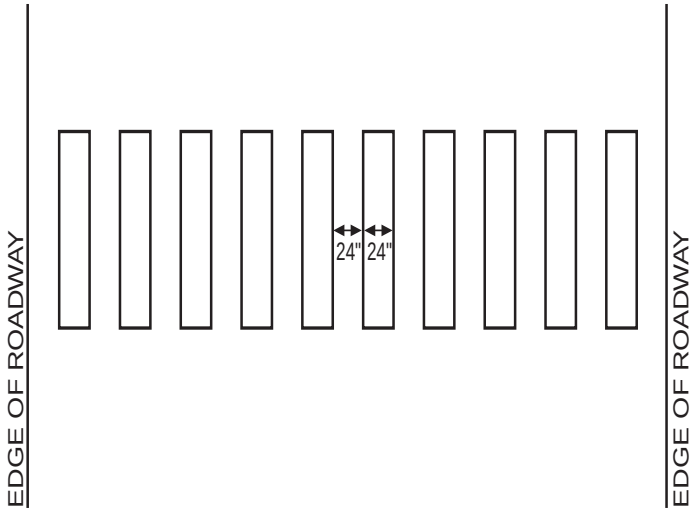
SOURCE: *TRB, 1994*

Appendix VIII-Pavement Marking Plan for Standard Cross Street Intersections

Cambridge Pavement Marking Plan for Standard Cross Street Intersection



Notes:
1. All crosswalk lines touch curb
2. Width of crosswalks varies, depending on width of street and traffic volumes
3. 4' of black pavement between stop line and crosswalk
4. Standard crosswalk width is 10-15'



Appendix IX-Wheelchair Ramp Standards

Mass. Highway Dept. Engineering Directive E-97-008 (10/09/97)

In accordance with 521 CMR Rules and Regulations of the Architectural Access Board (AAB) and Americans with Disabilities Act (ADA), the following will be adhered to on all projects:

1. All projects must be designed in accordance with the Wheelchair Ramp Standards booklet effective 10/8/97, and the Construction and Traffic Standard Details, 1996 Metric Edition as revised.
2. All projects which include wheelchair ramps must include construction drawings showing the location of all wheelchair ramps. Projects without construction plans must include these drawings in the Special Provisions of the project.
3. All proposed wheelchair ramp construction plans must use those symbols as shown in the Wheelchair Ramp Standards booklet and the Construction and Traffic Standard Details, 1996 Metric Edition as revised. The selected symbols must be representative of the finished ramp. The wheelchair ramp symbol illustrated in Table 2.1 of the Highway Design Manual showing plan symbols for existing features is sufficient to indicate existing wheelchair ramp locations.
4. The center line of the wheelchair ramp must be perpendicular to the curb. In cases where the crosswalk is skewed to the wheelchair ramp, a 2.2m (diameter) turning area, entirely contained within the crosswalk, must be provided at the base of the wheelchair ramp. If necessary, the crosswalk should be widened to accommodate the turning area.
5. Where grades of cross slopes change significantly and/or in densely populated urban areas where sidewalks significantly change in grade or cross slope, detailed sidewalk and wheelchair ramp grading plans must be developed to minimize impact to driveways and building entrances.
6. It is the responsibility of the design engineer to carefully review all wheelchair ramp locations on site during the design phase and to provide all necessary plans in accordance with AAB and ADA.
7. The entire wheelchair ramp shall be constructed of cement concrete, unless a project review by the Massachusetts Historical Commission under G.L. chapter 9 section 27c or the Federal Government pursuant to section 106 of the Federal Historic Preservation Act requires MassHighway to eliminate, minimize or mitigate said concrete construction as an adverse effect. Limits are defined in MassHighway Construction Standards drawings and in the Wheelchair Ramp Standards booklet effective 10/8/97.
8. Level Landing is defined as an area at the top of each wheelchair ramp consisting of a length no less than 48" (1219 mm) as measured from the back of sidewalk to the start of ramp (or the gutterline if there is no ramp length) and with the combination of cross slope toward the street (for drainage) and the profile grade along the sidewalk such that no grade in any direction on the landing exceeds 1.9% (this includes the steepest diagonal slope of the landing area).
9. The Contract Special Provisions must contain the following statements:
    A. "Contractors shall establish grade elevations at all wheelchair ramp locations, and shall set transition lengths according to the appropriate table in the Construction Standards (or to the details shown on the plans)."

B. "All wheelchair ramp joints and transition sections which define grade changes shall be formed, staked, and checked prior to placing cement concrete. All grade changes are to be made at joints."

The attached revised sheets replace the existing plates of the Massachusetts Highway Department (MassHighway) Construction and Traffic Standard Details 1996 Metric Edition as revised.

City of Cambridge Construction Specifications: 6" Cement Concrete Pedestrian Ramp

Work to be done under this item shall consist of the installation of pedestrian ramps in strict conformance with current Americans with Disabilities Act (ADA) regulations and the specifications for Items 701 and 701.1. Locations shall be as directed by the Engineer.

Prior to excavation, the Contractor shall review the pedestrian ramp location with the Engineer to determine what is necessary to allow for the installation to be compliant with ADA. Fixed objects such as utility poles and fire hydrants must be considered in location of pedestrian ramps. The type of pedestrian ramp may vary based on sidewalk width and slope. Please see details for further specifications.

At intersections, pedestrian ramps shall be located in front of vehicle stop lines and within the pedestrian crosswalk. The ramp shall be constructed so that the finished elevation of the concrete (curb removed) will meet the roadway flush (less than 1/2" lip) for a width no less than forty-two (42) inches. The elevation at this meeting point shall be properly designed to meet the gutter elevation of the road. The pavement gutter shall be patched under Item 472 after the pedestrian ramp has been installed. Pavement patching shall conform to the crown of the road where it meets the pedestrian ramp. Pavement patching shall not be used to create a flush surface with the ramp if it results in a raised portion of the street gutter line. The Contractor shall install pedestrian ramps in a manner which minimizes the potential for puddles in front of them.

Transition curbs shall not exceed one-in-twelve (1:12) and shall blend to meet the roadway gutter flush. Where sidewalks are too narrow to install a straight-in-line curb cut at a slope of one-in-twelve (1:12), transition curbs shall also slope at one-in-twelve (1:12). The Contractor shall use a digital "Smart Level" to check all sub-base grades for compliance prior to installation of concrete. The Contractor shall not proceed with concrete installation on a ramp that is out of compliance without first contacting the Engineer.

The broomed finish on pedestrian ramps shall be perpendicular to the direction of the slope.

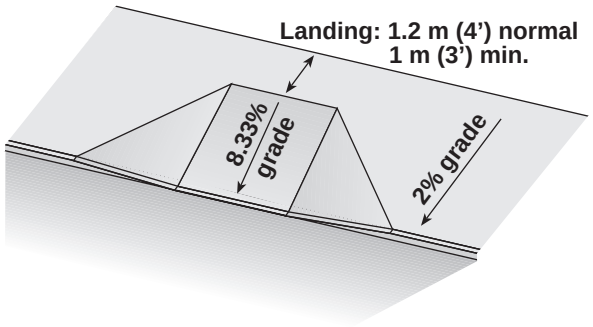


Figure 1: 1 m (3 ft) wide area at 2% cross-slope on sidewalks.

Appendix X- Sidewalk Construction Specifications

ITEM 701.00	4" CEMENT CONCRETE SIDEWALKS	SQUARE YARD
ITEM 701.10	6" CEMENT CONCRETE SIDEWALKS	SQUARE YARD

Work to be done under these items shall conform to the relevant provisions of the 1988 Massachusetts Highway Department Standard Specifications for Highways and Bridges Section 701 and the following:

Excavation and Compaction

This item shall include the excavation and disposal of the existing material and compaction of the sub-base prior to placement of concrete. If the existing material is unsuitable or more material is needed for sub-base, additional material shall be installed and paid for under Item 151 Gravel Borrow as directed by the Engineer. If the existing material is brick, the City reserves the right to have the Contractor truck them to a specified site in the City.

The Contractor shall exercise special care when excavating near trees. When major roots are in the way, the Contractor shall go under or between them. In no case shall the Contractor disturb the root structure of the trees without direction from the City Arborist. Exposed roots shall be covered promptly. Excavation of all tree wells shall be done entirely by hand.

Traffic signs shall be removed during the excavation. Signs to be reused shall be appropriately stored. Traffic signs to be replaced, as directed by the Engineer, shall be disposed of by the Contractor. Reinstallation of traffic signs shall be incidental to this item and done prior to the concrete pour. New traffic signs shall be installed and paid for under Item 877. All regulatory signs shall be maintained throughout construction.

The sub-base shall be prepared at the appropriate elevation for the depth of concrete to be installed. The sub-base shall be graded to allow for sidewalks to be sloped from the City right of way towards the street at 1/8 inch to the foot, or as directed by the Engineer.

The Contractor shall raise all water curb stop boxes to final grade and coordinate raising of other utility boxes prior to pouring of concrete. The contractor shall remove material from curb stop boxes after raising is complete and prior to pouring of concrete with compressed air. Prior to pouring the concrete, the Contractor shall go over locations where curb boxes have been raised with the Engineer.

Proper compaction shall be obtained by means of plate-type mechanical compactors. The material shall be compacted to niney-five percent (95%) of the maximum dry density at optimum moisture content as determined by the AASHTO Standard Method of Test T99 Method C.

Concrete

Concrete for sidewalks shall conform to the 1988 MHD Standard Specifications, M4.02.00 through M4.02.12. and be 4000 PSI at 28 day test, 3/4 inch coarse aggregate, 610 pounds cement per cubic yard, 6% air entrained (AASHTO - M154), Type A water reducing admixture (AASHTO - M194), 3 to 4 inch slump, and Type II dark-colored by adding 1-1/2 to 2 lbs. of lamp black per cubic yard at the plant.

The concrete shall contain 1 pound of 100% polypropylene micro-fiber per cubic yard. Fiber shall be added during batching at the plant to insure uniform distribution. The micro-fiber shall be W.R. Grace micro-fiber or equal and shall be used in accordance with the supplier's specifications.

Installation

Concrete shall be installed to a depth of 6" across driveways, at street intersection corners (5' beyond the point of tangent on either side of the corner curve), and at other locations as directed by the Engineer. At all other locations, concrete shall be installed to a depth of 4". Pedestrian ramps shall be installed and paid for under Item 701.2.

Finishing shall be as specified in Subsection 701.61B of the 1988 MHD Standard Specifications. Concrete shall be membrane-cured. The curing compound shall not discolor the concrete and shall be applied according to the manufacturer's specifications. The mixture shall be applied immediately after the finishing is complete and free water has left the concrete's surface. The Contractor shall provide the Engineer with the curing compound specification prior to its use.

Expansion joints shall be placed every 30 feet. Expansion joints shall also be placed around all appurtenances such as utility poles, hydrants, manholes, and other obstructions extending into and through the sidewalk. Expansion joints installed around utilities shall be 3/8" foam expansion joint polyethylene at a depth of 4". It is also required that an expansion joint of 1/4" thick foam expansion at 4" deep is placed longitudinally along the granite curb between curb and the concrete and also between building, retaining wall and the concrete as directed by the Engineer. Six inch expansion joints shall be placed at all locations where six inch concrete corner slabs or driveways meet four inch concrete walks. Expansion material protruding above the finished sidewalk shall be trimmed flush with a sharp instrument as soon as the concrete has set.

Between the expansion joints at 30 foot spacings, the sidewalk shall be divided at 5 foot intervals with score joints, made with creasing tools having a penetration depth of minimum 1 1/2" and at 10 foot intervals with construction joints. Joints shall be placed 90 degrees transverse with the direction of traffic and shall be straight within a tolerance of 1/4 inch of a straight edge layed along the joint. Longitudinal joints shall be installed, at the direction of the Engineer, when the sidewalk is greater than 6' wide.

Payment for work under these items shall be at the contract unit price per square yard and shall include full compensation for excavation, removal and replacement of traffic signs, preparation of sub-base, raising of water curb stop boxes, furnishing and placing cement concrete, expansion joint, and any other incidentals necessary for the satisfactory completion of this work as specified.

ITEM 706.10	NEW BRICK WALK ON 4" CONCRETE BASE	SQUARE YARD
ITEM 706.20	NEW BRICK WALK ON 6" CONCRETE BASE	SQUARE YARD

Work to be done under these items shall conform to the relevant provisions of the 1988 Massachusetts Highway Department Standard Specifications for Highways and Bridges Section 700 and the following:

Placement of the concrete base shall be in conformance with the specifications for Items 701 and 701.1 except:

1. Concrete shall be 3500 psi with no fiber.
2. Final finishing and brooming is not necessary as this is a base course.

The concrete base shall be poured to an elevation which allows for the stone dust setting bed and brick installation to result in the appropriate final elevation. A new brick walk shall be installed on the concrete base in compliance with the following:

Brick

Brick shall be "City Hall Pavers" manufactured by Stiles and Hart, Inc., Bridgewater, MA

or an approved equal. Brick shall have a color range of medium red to dark red, mixed with dark purple. Bricks shall be approved by the Engineer prior to installation.

The paving brick shall be clay brick, uniform in size and evenly burned, and when broken shall show a dense structure free from lime, air pockets, cracks and lamination. Laminated bricks will not be accepted.

The bricks shall be for exterior paving and shall meet the requirements of ASTM C-902-Class SX Type I with average water absorption of not more than 5% with the five hour boil and an average compressive strength of 8,000 PSI or more. Brick shall pass a minimum of 100 freeze thaw cycles.

Stone Dust

The stone dust setting bed shall contain coarse sand aggregates mixed with the fine stone dust as processed by Rowe Contracting Company, Malden, Massachusetts or Quinn Perkins Company, Burlington, Massachusetts or approved equal, in order to add stability to the brick walk so that bricks will not roll, move or rock. The stone dust for joint sweeping shall be mixed with Portland Cement Type II (2 Stone Dust to 1 Portland Cement) and be free of coarse aggregates, enabling the fines to freely fill in around all sides of the bricks.

Iron Edge

Shall be provided where required as directed by the Engineer.

Specifications shall be as follow: Height:1.5", Flange:1.75", Lengths: 6'0" or 8' 0", Thickness:16 gauge, Material: Galvanized steel.

Spikes: 10" Spiral galvanized steel placement every 12" .

Iron Edge Specification: Galvanized steel paver restraint. Sections are to be L-shaped galvanized. Sections are to be notched to provide for smooth curves and crisp angles. Spikes are to be galvanized spiral not less than 10" in length

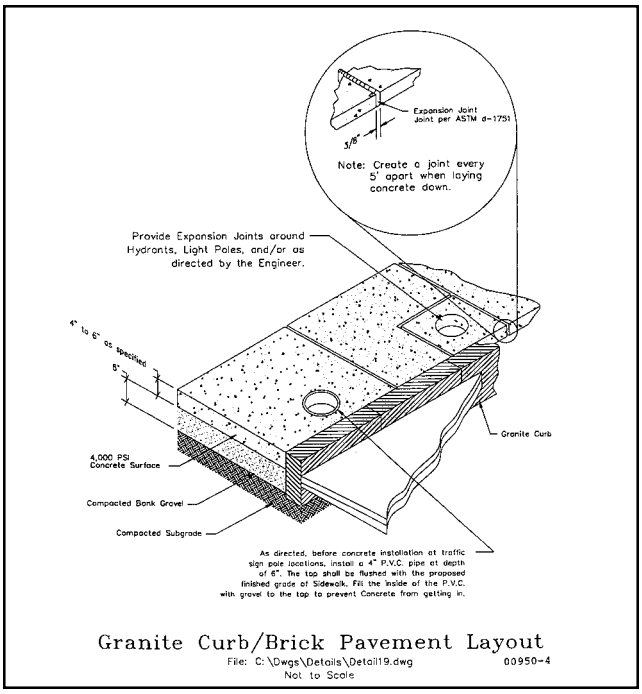
Iron Edge to be supplied by Border Concepts, Inc., P. O. Box 471185, Charlotte, NC 28241, Telephone numbers: 1-800-845-3343 or 1-704-541-5509, Fax Number: 1-704-541-5610 or approved equal.

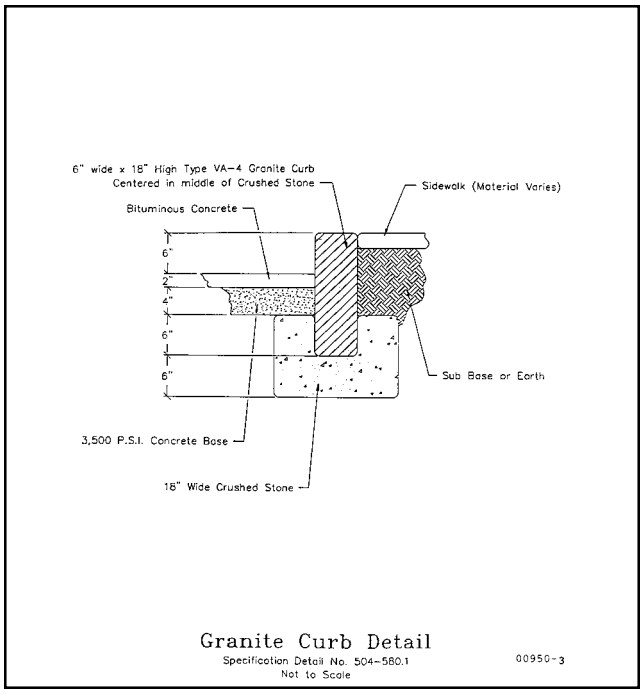
Installation

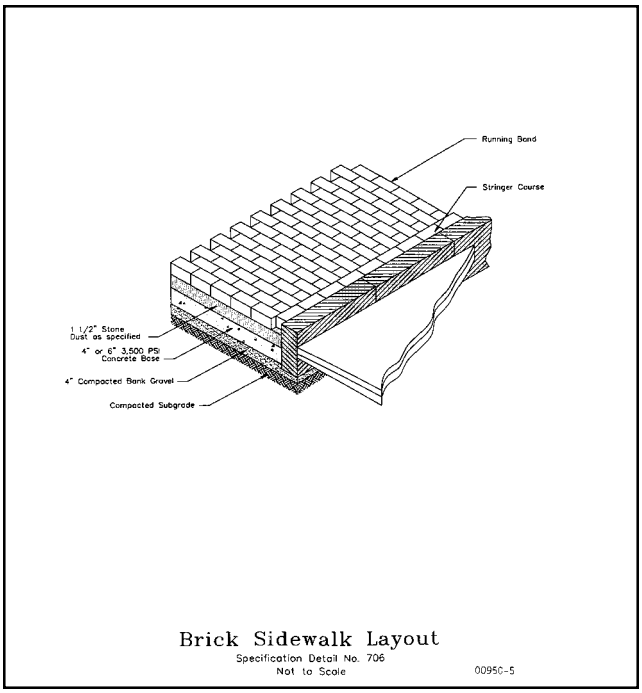
A 1" (+/- 1/2") stone dust setting bed shall be installed on the concrete base.

After all the bricks are in place, stone dust free of coarse aggregates shall be swept into the voids around the bricks.

Payment for work under these items shall be at the contract unit price per square yard and shall include full compensation for excavation, concrete base, new bricks, stone dust, Iron Edge, Portland Cement, labor, tools, equipment, and any other incidentals necessary for the satisfactory completion of this work as specified.







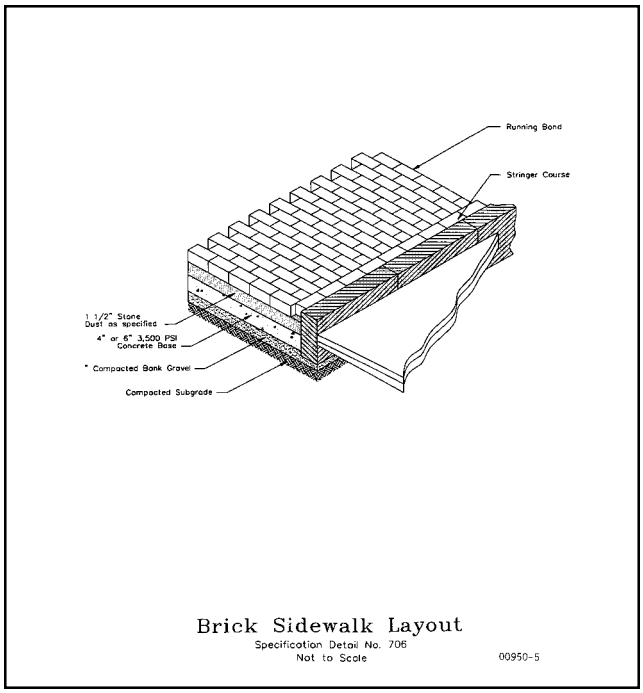


Figure 1: Sidewalk construction details.

Appendix XI-Crosswalk Specifications for Inlays

ITEM 870.40	4" REFLECTORIZED WHITE LINE INLAY	LINEAR FOOT
ITEM 870.50	6" REFLECTORIZED WHITE LINE INLAY	LINEAR FOOT
ITEM 870.60	12" REFLECTORIZED WHITE LINE INLAY	LINEAR FOOT
ITEM 870.70	24" REFLECTORIZED WHITE LINE INLAY	LINEAR FOOT
ITEM 871.4	4" REFLECTORIZED YELLOW LINE INLAY	LINEAR FOOT

This item consists of furnishing and installing retro-reflective performed inlaid patterned pavement markings.

The work shall be in accordance with this provision. Material shall be 3M Series 380 patterned tape or equal.

DESCRIPTION:

The preformed patterned markings or legends shall consist of white or yellow films with ceramic beads incorporated to provide immediate and continuing retro-reflection and long term durability.

REQUIREMENTS:

Materials:
The preformed pavement markings shall consist of highly durable retror-eflective pliant polymer materials designed for longitudinal and word/symbol markings subjected to high traffic volumes and severe wear conditions such as shear action from crossover or encroachment on typical longitudinal configurations such as edge lines and lane lines.

Composition:
The retro-reflective pliant polymer pavement markings shall consist of a mixture of high quality materials, pigments and glass beads distributed throughout its base cross-sectional area, with a reflective layer of ceramic beads bonded to a durable poylurethane topcoat surface. The patterned surface shall have approximately 50% + or - 15% of the surface area raised and presenting a near vertical face to traffic from any direction. The channels between the raised areas shall be substantially free of exposed beads or particles.

Conformability and Resealing:
The preformed markings shall inlay into the new highway surface by the application procedure prescribed. The pavement markings shall be capable of inlay on new, dense and open graded asphalt concrete wearing courses during the paving operation in accordance with manufacturer's recommendations prior to inlay. After application the marking shall be ready for traffic when the new road surface is ready.

The pavement marking shall be capable of use for patching worn areas of the same type in accordance with manufacturer's instructions.

Color:
The preformed markings shall consist of white and yellow films with pigments selected and blended to conform to standard highway colors. No yellowing on White.

Skid Resistance:
The patterned surface of the retro-reflective pliant polymer shall provide an initial average skid resistance value of 45 BPN when tested according to ASTM E 303 except values will be taken at downweb and at 45 Degree angle from downweb.

These two values will then be averaged to find the skid resistance of the patterned surface.

Thickness:
The patterned material without adhesive shall have a minimum caliper of 0.065" (1.65mm) at the thickest portion of the patterned cross-section and a minimum caliper of 0.02" (.51mm) at the thinnest portion of the cross-section.

Performance Requirements & Material Replacement Obligations:
The bidder shall identify all equipment, solvents and/or primers necessary and provide recommendations for applications that will assure effective product performance. Pre-formed markings for longitudinal lines will offer a minimum of four years warranted service life when in laid within manufacturer's guidelines, and two years for legends and symbols. The manufacturer will replace the material which fails due to loss of adhesion or complete wear through.

A certified manufacturer's installer will do the work subject to the Engineer's or manufacturer's inspection. Contractor will replace material which fails if a certified manufacturer's sub-contractor or a certified contractor is not employed to assure proper application procedures.

The bidder shall identify all equipment, solvents and/or primers necessary and provide recommendations for application that will assure product performance.

INSTALLATION:

Application of Markings:
The markings shall be applied and tamped in accordance with the manufacturer's installation instructions by a certified manufacturer's stripper. Marking configurations shall be in accordance with the "Manual on Uniform Traffic Control Devices."

The manufacturer shall provide application equipment, manual or automatic as necessary for the job requirements. These applicators shall be capable of applying two 4' lines simultaneously with a 4" spacing between lines. These units shall be capable of applying an unlinered pre-coated pressure sensitive adhesive pavement marking tape.

When markings are specified in the contract for newly paved asphalt concrete surfaces, they shall be applied before the road is open to traffic. The markings should be inlaid in the fresh surface during final rolling of the mat.

Contractor shall not attempt to apply tape without assistance of manufacturer's representative or a certified manufacturer's local representative a minimum of 10 days prior to application of tape to coordinate all phases of application.

Inlay Procedure:
Inlay involves pressing the tape into the new surface when the pavement is still warm. The speed of the paver shall be such that the temperature of the asphalt is in a range of 120 degrees - 50 degrees F at the time of inlay by the striping crew. A certified manufacturer's installer or manufacturer's representative will have been trained in determining the correct temperature.

A 10 ton finish roller shall be assigned to the inlay crew at all times.

Application procedure for inlaying the tape shall be per manufacturer's application instructions and in concert with the certified stripper.

The paving and tape installation procedure will be as follows:

1. Paving
2. Compaction
3. Pre-marking the road
4. Tape Application
5. Finish Rolling

Appendix XII-Fixed Obstacle Adjustment Factors for Walkways

Obstacle	Approx. width preempted (ft.)[34]
Street Furniture	
Light poles	2.5-3.5
Traffic signal poles and boxes	3.0-4.0
Fire alarm boxes	2.5-3.5
Fire hydrants	2.5-3.0
Traffic signs	2.0-2.5
Parking meters	2.0
Mail boxes (1.7'x1.7')	3.2-3.7
Telephone booths (2.7'x2.7')	4.0
Waste baskets	3.0
Benches	5.0
Public underground access	
Subway stairs	5.5-7.0
Subway ventilation grates (raised)	6.0+
Landscaping	
Trees	2.0-4.0
Planting boxes	5.0
Commercial uses	
News stands	4.0-13.0
Vending stands	variable
Advertising displays	variable
Sidewalk cafes (2 rows of tables)	variable; try 7.0
Building protrusions	
Columns	2.5-3.0
Stoops	2.0-6.0
Cellar doors	5.0-7.0
Standpipe connections	1.0
Awning poles	2.5
Truck docks (trucks protruding)	variable
Garage entrance/exit	variable
Driveways	variable

— Northwestern University Traffic Institute

34 Curb to edge of object, or building face to edge of object. To account for the avoidance distance normally occurring between pedestrians and obstacles, an additional 1.0 to 1.5 feet must be added to the preemption width for individual obstacles.

Appendix XIII-Physical Activity and Fitness

Excerpt from *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*

— U.S. Dept. of Health and Human Services, 1990

Regular physical activity increases life expectancy, can help older adults maintain functional independence, and enhances quality of life at each stage of life. The beneficial impact of physical activity touches widely various diseases and conditions. Regular physical activity can help to prevent and manage coronary heart disease, hypertension, diabetes, osteoporosis, and depression. It has also been associated with a lower rate of colon cancer and stroke, and may be linked to reduced back injury. It is an essential component of weight loss programs.

Physical activity is a complex behavior and its relationship with health is multifaceted. Regular vigorous physical activity promotes cardiorespiratory fitness and helps prevent coronary heart disease. Activity that builds muscular strength, endurance, and flexibility may protect against injury and disability. And any activity that expends energy is important in weight control. Physical activity can also produce changes in blood pressure, blood lipids, clotting factors, and glucose tolerance, that may help prevent and control high blood pressure, coronary heart disease and diabetes.

While activity should be habitual, it need not be unduly strenuous. People who engage daily in light to moderate exercise, equivalent to sustained walking for about 30 minutes a day, can achieve substantial health gains. Increasing evidence suggests that even small increases in light to moderate activity by those who are least active will produce measurable health benefits.

Of particular importance is the role of physical activity in preventing coronary heart disease, the leading cause of death in the United States. A sedentary lifestyle appears to be an independent risk factor for coronary heart disease, nearly doubling a person's risk. Its effect on coronary heart disease risk is almost as great as the better known risk factors, such as cigarette smoking and high blood pressure. Because more people are at risk of coronary heart disease due to physical inactivity than to any other single risk factor, it has an especially great public health impact.

Few Americans engage in regular physical activity despite the potential benefits. Currently, only 22 percent of adults engage in at least 20 minutes of light to moderate physical activity 5 or more times per week, and only 12 percent of the population exercise 3 or more time a week at the more vigorous level necessary to improve cardiorespiratory fitness. Nearly 25 percent of adults report no leisure-time physical activity, and the prevalence of sedentary behavior increases with advancing age.

Introduction to *Physical Activity and Health: A Report of the Surgeon General*

— Donna E. Shalala, Secretary of Health and Human Services, July 1996

. . .A regular, preferably daily regimen of at least 30-45 minutes of brisk walking, bicycling, or even working around the house or yard will reduce your risks of developing coronary heart disease, hypertension, colon cancer, and diabetes. And if you're already doing that, you should consider picking up the pace: this report says that people who are already physically active will benefit even more by increasing the intensity or duration of their activity.

. . .We have found that 60 percent—well over half—of Americans are not regularly

active at all. For young people—the future of our country—physical activity declines dramatically during adolescence. These are dangerous trends. We need to turn them around quickly, for the health of our citizens and our country.

We will do so only with a massive national commitment . . .Families need to weave physical activity into the fabric of their daily lives. Health professionals, in addition to being role models for healthy behaviors, need to encourage their patients to get out of their chairs and start fitness programs tailored to their individual needs. Businesses need to learn from what has worked in the past and promote worksite fitness, an easy option for workers. Community leaders need to reexamine whether enough resources have been devoted to the maintenance of parks, playgrounds, community centers, and physical education. And the media and entertainment industries need to use their vast creative abilities to show all Americans that physical activity is healthful and fun—in other words, that it is attractive, maybe even glamorous!

Daily constitutional: Make it two miles

—*Boston Globe*, January 8, 1998, by Richard A. Knox

Simply walking a couple of miles a day can sharply reduce older men's risk of death from all causes, including cancer and heart disease, according to a study published today.

Researchers compared the walking habits of 707 retired men in Honolulu between the ages of 61 and 81, none of them smokers.

Over a 12-year period, 43 percent died among the group who walked less than a mile a day. Among those who walked at least 2 miles a day, only 22 percent died.

The pattern held after researchers accounted statistically for other risk factors, such as high cholesterol levels, obesity, high blood pressure, alcohol consumption and diet.

Cancer death rates were also cut in half by the 2-mile-a-day habit. About 6 percent of those who walked that much died of cancer over the 12-year period, versus 13 percent among those who walked less than a mile daily.

Deaths from heart disease and stroke were 66 percent lower among the two-milers.

Few studies have been done on the benefits of such low-level exercise among older people. A 1993 report from the long-running Harvard Alumni Study found a less pronounced reduction in overall mortality, but it included smokers, non-retired men, and those not physically capable of long walks.

"Low-intensity activity is likely to benefit the health of the elderly," the researchers, from universities in Virginia, Minnesota and Hawaii as well as various federal agencies, wrote in this week's *New England Journal of Medicine*.

Besides, they added, it may be easier to get people to take long walks than to get them to do more strenuous exercise.

Exercise cuts cancer risk, study finds: A one-hour daily walk is suggested as a deterrent for colon disease

—*Boston Globe*, July 14, 1997, by Ira Dreyfuss

Washington—A daily walk may cut a woman's risk of colon cancer in half, a new study finds.

"Increasing physical activity levels may be an effective approach for reducing the burden of colon cancer in our society," Harvard researchers wrote in the report, published in the current Journal of the National Cancer Institute.

Walking at a normal or brisk pace for one hour a day is associated with a 46 percent reduction in risk of the cancer in women in the United States, the study said. Women who exercise only half as much can still reduce their risk by a quarter, said Dr. Graham A. Colditz, the study's senior author.

The findings add to the reasons, including reduced risk of heart disease, for women to exercise more, Colditz said. "Our data are sufficient, in the context of everything else, to support the recommendation that women increase their activity," he said.

The findings are based on 1986-92 data from the Nurses' Health Study, a leading database of women's health. The researchers analyzed activity levels and other data of 67,802 participants every two years.

The study computed the amount of energy spent in activities and noted 212 cases of colon cancer among the study participants. Walking was the most common activity, reported by 70 percent of the participants.

Women in the upper 20 percent in energy expenditure per week, which required at least brisk walks totaling more than seven hours, had 54 percent less colon cancer risk than did women in the bottom 20 percent, the study found. As the amount of energy used fell, so did the amount of risk reduced.

The benefit is similar to what had already been found in men, Colditz said.

America's kids are more inactive than ever: Walking can make a healthy difference

— by Emily Smith, University of North Carolina Highway Safety Research Center, for the Partnership for a Walkable America

Providing walking places that are safe and accessible for our children can do more than just prevent tragic injuries and deaths.

According to Mark Fenton, editor of Boston-based *Walking Magazine*, if children walk regularly, it can also improve their health and set patterns that will carry them into adulthood.

"These days, in the age of video games and VCRs, children are heavier and more inactive than ever," said Fenton, who is a member of the Partnership for a Walkable America—a coalition of private, state and federal organizations united together with the common cause of increasing public awareness about the benefits of walking.

"We're essentially socializing kids to be inactive," he said. "Kids naturally want to be active. They run around and squeal and make noise and what do we do when we start them in school? One of the first things we say is 'Sit down and don't stand up or wiggle unless you're called upon. Only run around during recess or gym.' Then in life, as they get older, we only ask them to move around *less*."

"The fundamental absurdity is that when schools are low on money, what's the first thing they cut?" Fenton asked.

"Physical education and sports," he said, answering his own question.

"Well, I understand that outfitting a football team is costly, but interestingly enough, taking kids for a walk costs nothing," he said. "If you did institute a walking program in the schools, you could have the walks be part of biology class or sociology class where the kids could look at their communities."

Inactive Lifestyles May Begin in Youth

Obesity is a problem in the United States, according to the National Center for Health Statistics.

According to their data, about one in every three Americans, ages 35 through 45, was obese, as of 1991. The scary part is that this figure is 36 percent higher than it was in 1962.

"This obesity seems to be related to physical inactivity," Fenton said, "and the seeds of the problem we're seeing may well be sown in youth."

If the "Youth Risk Behavior Survey" conducted in 1990 by the Centers for Disease Control and Prevention in Atlanta (CDC) is any indication, that may well be the case. The results from this survey indicate that teens spend more time watching television than they do exercising.

CDC, which is a member of the Partnership for a Walkable America, surveyed 11,631 U.S. high school students, grades 9 through 12, and found that just 12.37 percent of the students engaged in 20 minutes of vigorous physical activity three or more times a week.

By contrast, about 70 percent of the students surveyed said they watched at least an hour of television every school day. About 35 percent of those surveyed said they watched 3 hours or more of television on each school day.

The survey also found that 43.7 percent of the boys and 52 percent of the girls were not even enrolled in a physical education class.

This inactivity has had repercussions on America's kids, said Dr. Michael Pratt of CDC.

"There was a huge increase in childhood obesity between 1980 and 1990," said Dr. Pratt, who is the acting chief for the Physical Activity and Health Branch in the Division of nutrition and Physical Activity at CDC.

"Childhood obesity has been relatively stable through the 1960s and 1970s, but now it has become a really critical problem," he said.

Dr. Pratt attributed the rising number of overweight kids to the increasing amount of high-calorie junk foods kids ingest as well as to the overall decrease in physical activity among children.

"Physical education classes are getting fewer and farther between," Dr. Pratt said. "Illinois is now the only state that has mandatory physical education classes for kids grades kindergarten through 12."

The problem is so alarming that this year CDC joined forces with doctors and researchers from across the United States to form "The Physical Activity and Nutrition Program for Adolescents"—known as the "PAN" program. In coordinating this program, CDC is working in conjunction with Emory University's Nutrition and Health Sciences Center, the International Life Sciences Institute and the National Foundation for the Centers for Disease Control and Prevention.

"The PAN program is a public/private partnership whose goal is to get at the underlying reasons behind why there is such a problem with adolescent obesity and then develop interventions to combat the problem," Dr. Pratt said.

Exercise (including walking) can improve health

According to Fenton, it is not just American children and adolescents who are inactive. Fenton says that adults in the United States are more sedentary than ever as well.

"Americans are less active than they ever have been," he said. "Twenty-five percent of our population is essentially sedentary, fifty-five percent are only sporadically active, and only about ten percent of the population exercises regularly."

This lack of exercise is killing us, say researchers at the CDC and the American College of Sports Medicine. According to a joint statement they issued this year, approximately 250,000 deaths a year in the United States can be attributed to physical inactivity.

The good news from these organizations is that 30 minutes daily of moderate exercise can promote long-term health.

"Walking is a good way to get that exercise," Fenton said. "There are dozens of ways that a 30-minute walk can be fit into your day. It doesn't have to be putting on lycra tights and going out and doing power walking.

"We encourage people to make a walk part of their daily life—to intentionally keep a post office box and walk down there to get the mail, or walk to the video store or to the place where you get your milk or newspaper," he said.

And kids? How do we get them to walk more?

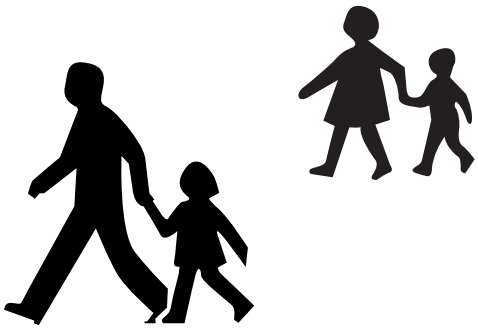
"Role modeling is a very important thing," Fenton said. "If you're the kind of parent who actually suggests to their kid that you need not drive the car everywhere and that maybe they could walk back from band rehearsal with a couple of friends instead of you going to get them, that can help set the tone a lot."

Start a school walking program

Fenton also suggested parents in neighborhoods join together and approach their schools about starting a walking program. He said parents could even organize a "walk to school" week, with different parents from the neighborhood volunteering to be a little late for work one day so as to serve as a volunteer crossing guard in their community for the event.

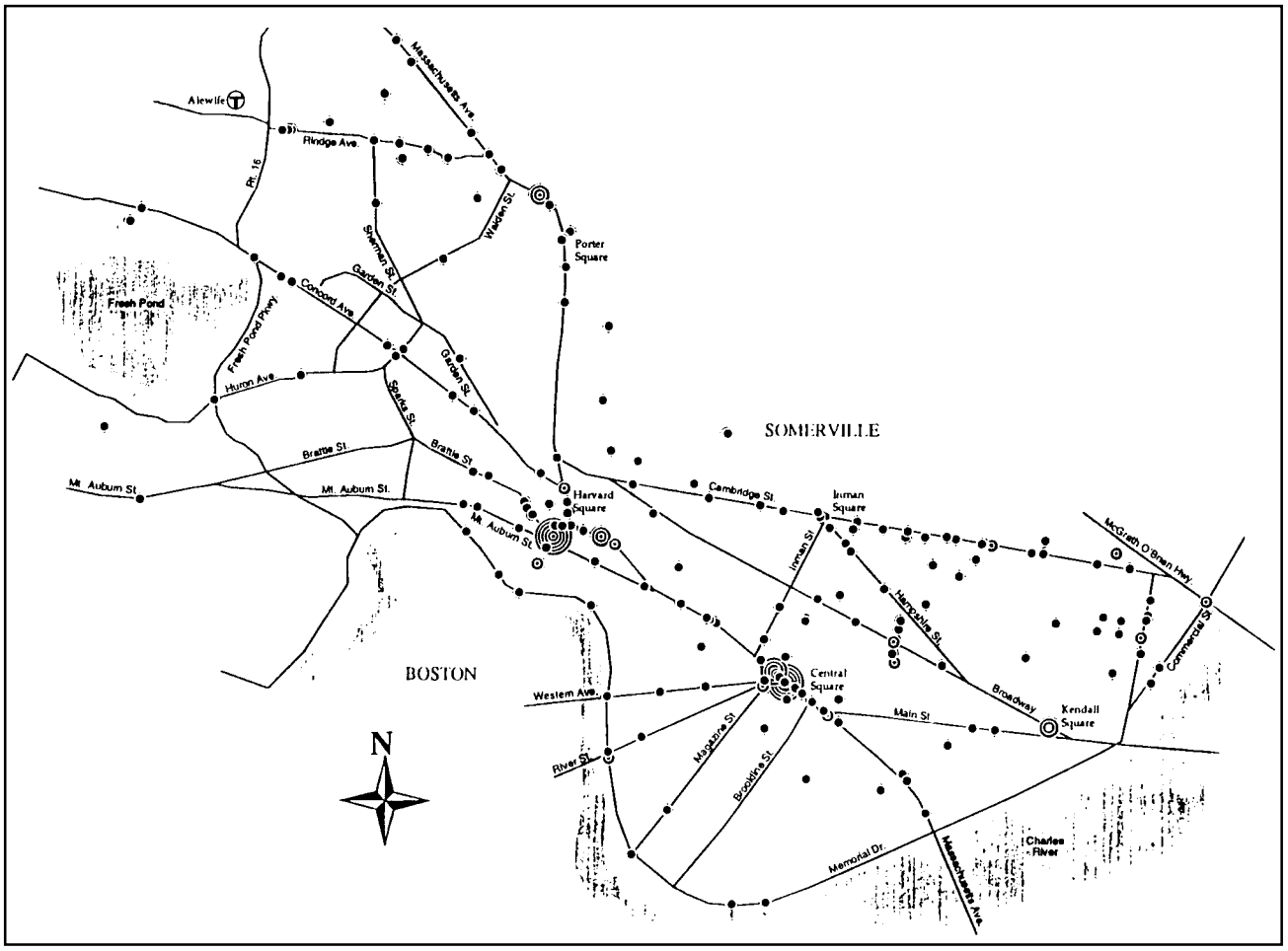
He added that local police could come into the school the week before the program to talk to the kids about pedestrian safety and that the students could make posters announcing the event to hang in their community.

"The point is, there's a lot that parents and schools can do," Fenton said. "A parent can walk into a school and say, 'I'd like to lead a walk', and if it's a well thought out program, they'd be delighted."



Appendix XIV-Pedestrian-Vehicular Crashes with Automobiles in Cambridge

Pedestrian Crashes with Automobiles within the City of Cambridge, as Reported for the Years 1989, 1990, & 1991 (Central Transportation Planning Staff)



LEGEND

- Fatal pedestrian accident
- One pedestrian accident
- Two pedestrian accidents at this location
- Three pedestrian accidents at this location
- Four pedestrian accidents at this location
- Five pedestrian accidents at this location
- Six pedestrian accidents at this location

Appendix XV-Cambridge Travel Lane Widths

FACILITY	STANDARD WIDTH	MINIMUM WIDTH
Vehicular Travel Lane	11 ft. (3.4 meters)	10'8" (3.25 m)
		10' (3 m) allowed in some circumstances
		9'10" (2.9 m) on local residential streets
Wide Travel Lane (with edge lines)	13-15 ft. (3.9-4.5 m)	N/A
Bicycle Lanes	6 ft. (1.8 m)	5 ft. (1.5 m) against parking
		4 ft. (1.2 m) against curb
Parking Lanes	8 ft. (2.4 m)	7'6" (2.3 m) preferred
		7' (2.1 m) allowed in some circumstances
		7'3" (2.2 m) residential streets preferred; 7' (2.1 m) permitted in some circumstances

Figure 1: Cambridge standards for lane widths.